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COUNCIL FOR THE DISABLED
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MANUAL OF METHODS FOR CONSTRUCTION OF INEXPENSIVE REHABILITATION EQUIPMENT FOR USE IN "ACTIVITIES OF DAILY LIVING" IN HOSPITALS AND HOMES

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PREFACE

This manual describes basic pieces of equipment useful in the care of physically-handicapped patients. Most of these items were developed in the Physical Medicine and Rehabilitation Department of Okinawa Central Hospital at Gushikawa, Okinawa. Conventional techniques for constructing a lapboard and preparing a condom-drainage system also are included here, in order to assemble in one collection a more complete set of instructions for preparing necessary equipment.

The methods for constructing the pieces of equipment which are presented here can be used by Physical Medicine and Rehabilitation Departments' construction facilities by commercial carpenters, or by patients' families. In an area where there is need for such equipment, one or more government, volunteer, or private agencies can be established to construct this kind of equipment.

The equipment described in this manual was developed through the cooperative efforts of rehabilitation workers from three countries–the Ryukyu Islands, the United States of America, and the Republic of Korea. The project could not have been accomplished without the technical knowledge of the individual contributors gained from the training institutions of Tokyo National Chest Hospital School of Rehabilitation; Japan Correspondence Arts School; Okinawa Rehabilitation and Training School for the Disabled; Okinawa University; Queen's Medical Center at Honolulu, Hawaii; School of Physical Therapy of Stanford University; Institute of Physical Medicine and Rehabilitation of New York University; and of the University of Minnesota. Moreover, this work could not have been accomplished without the support and funds given to Okinawa Central Hospital Physical Medicine and Rehabilitation Department by many volunteer organizations of Okinawan and United States citizens in Okinawa.

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SECTION 1. FOOTBOARD

ADJUSTABLE FOOTBOARD

Description and Uses:

This footboard is easy to construct. It is readily adjustable to the height of a patient (Fig. 1-1). When in use, the footboard should be tied to the end of a patient's bed (Fig.1-3). Care of Sheets and covers is simple with the use of the footboard (Fig. 1-5).

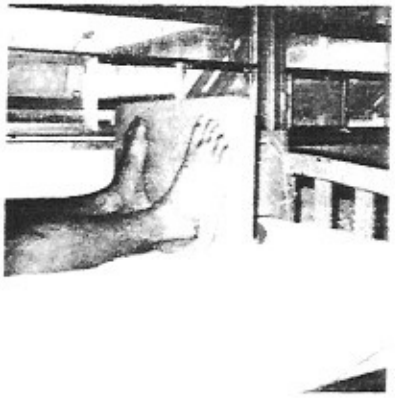


Fig. 1-1. Patient using footboard.

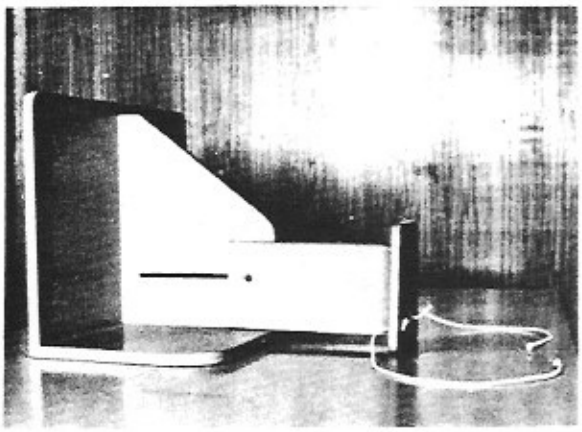


Fig. 1-2. Side view.

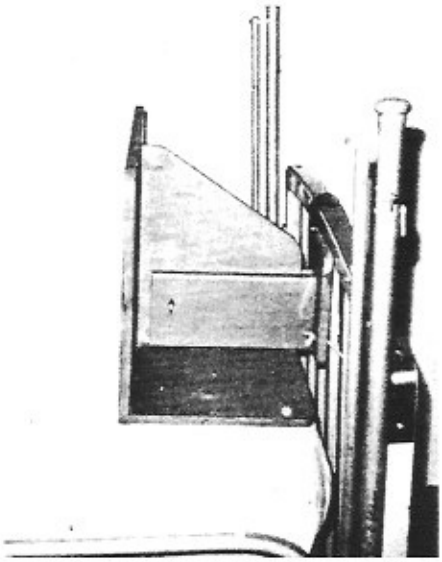


Fig. 1-3. Footboard tied to frame of hospital bed.

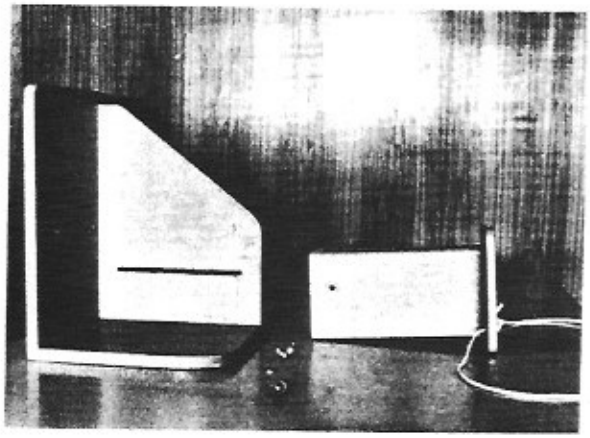


Fig. 1-4. Side view of parts of footboard.

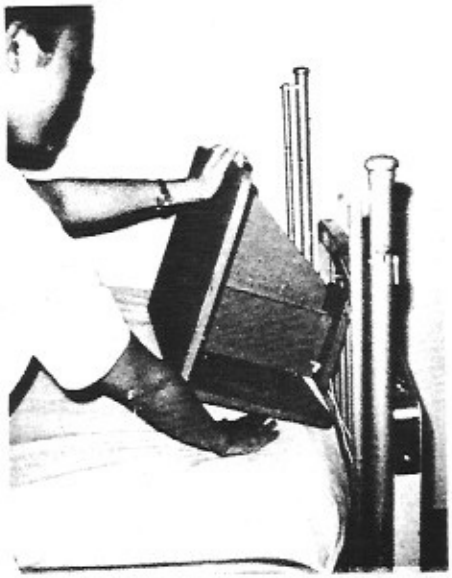


Fig. 1-5. Nurse making bed while footboard is in place.

Details of Construction: (Figs. 1-6 through 1-9)

MATERIALS AND INSTRUCTIONS

LUMBER

5/8 in. (1.6 cm.) Plywood

Cutting Plan

1	20 x 14 in. (50.7 x 35.5 cm.)	for footrest.	a
1	20 x 10 in. (50.7 x 25.4 cm.)	for bottom.	b
1	12 1/2 x 10 x 7 in. (31.7 x 25.4 x 17.7 cm.)	for middle support. Cut 1/4 in. (0.7 cm.) slot 2 1/2 in. (6.3 cm.) from bottom.	c
2	10 x 5 in. (25.4 x 12.7 cm.)	for adjustable slide. Drill holes for bolts 1 1/2 in. (3.8 cm.) from ends.	d
1	7 x 6 x 5 in. (17.7 x 15.2 x 12.7 cm.)	for attachment to bed. Drill two holes 1 in. (2.5 cm.) from bottom corners for heavy cord.	e

MISCELLANEOUS

1 2 1/2 in. (6.3 cm.) metal bolt with wing-nut and 2 washers.

2 18 in. (0.5 meter) heavy cord for tying footboard to bedframe.

Wood-glue

Nails

FINISH

Sand paper
Wood-filler
Wood stain
Varnish
Paint brushes

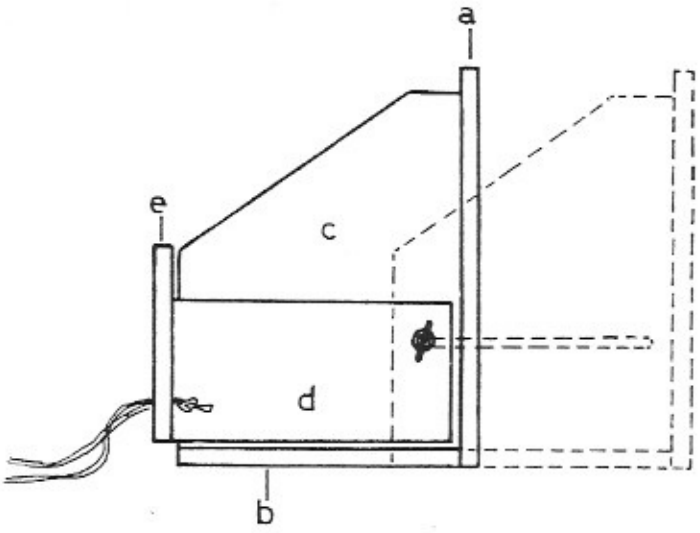


Fig. 1-6. Side view.

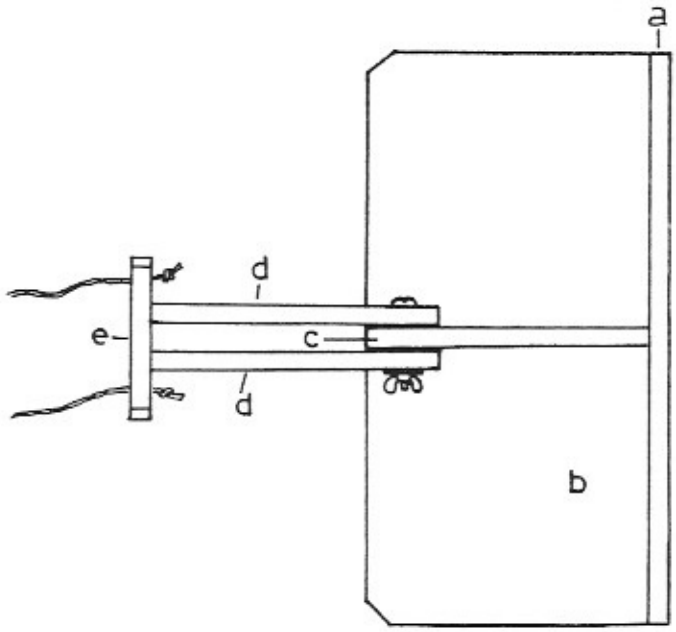


Fig. 1-7. Top view.

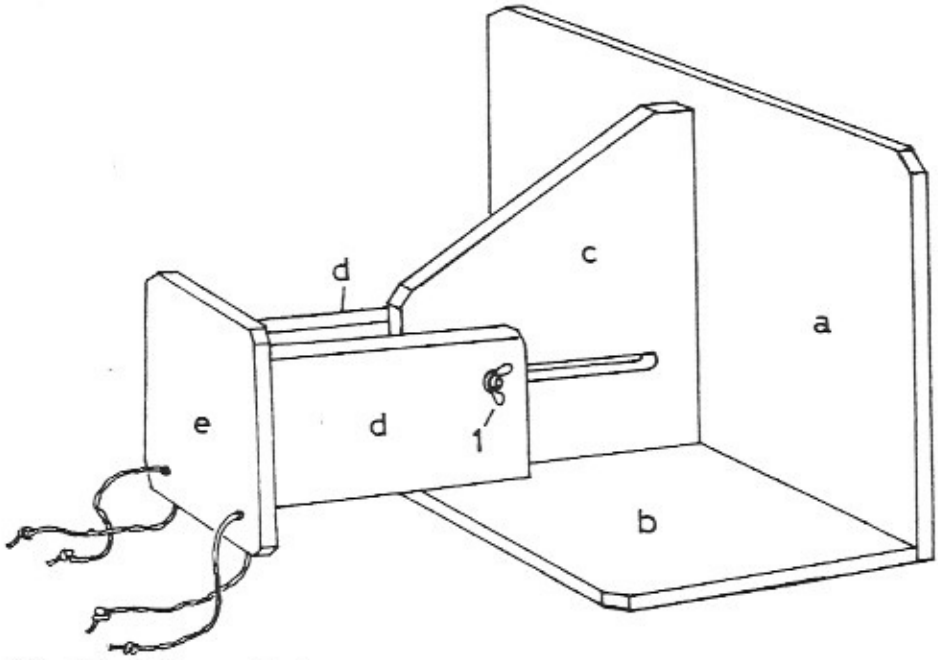


Fig. 1-8. Oblique sideview.

Variation: Shorter or Longer in Adjustable Length.

The adjustable arms of the footboard may be shortened in length to accommodate tall patients (Fig. 1-9). It is desirable that a hospital should have in stock footboards of the standard size (page 3), as well as some that are shorter and (for children) others that are longer than the standard size.

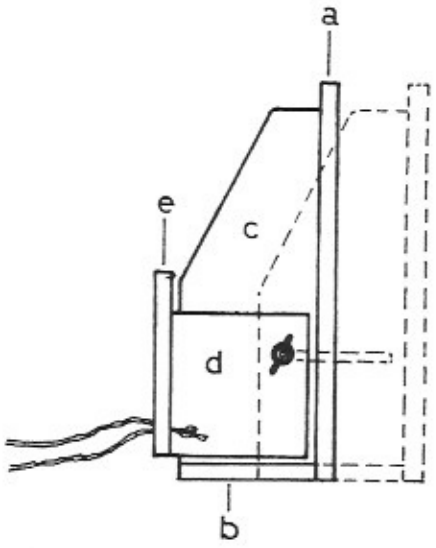


Fig. 1-9. Variation: Footboard with shortened adjustable arms.

SECTION 2. WALKER

PLASTIC PIPE WALKER FOR ADULTS

Description and Uses:

This stable walker (Fig. 2-1) is fashioned after a conventional commercial model. The plastic pipe and plastic fittings used for construction are readily available and inexpensive. Compared with metal pipe, plastic pipe is very light and easy to cut and fasten.

Fig. 2-1. Patient using walker made from plastic pipe.

Details of Construction: (Figs. 2-2 and 2-3)

MATERIALS AND INSTRUCTIONS

PLASTIC PIPE

1 1/4 in. (3.2 cm.) in diameter

Cutting Plan

2	31 3/4 in. (80.6 cm.)	a
2	30 in. (76.2 cm.)	b
2	12 in. (30.5 cm.)	c
2	8 in. (20.3 cm.)	d
1	20 in. (50.8 cm.)	e
1	16 in. (40.6 cm.)	f

MISCELLANEOUS

2	plastic T-connectors to fit pipe.	g
6	right-angle plastic connectors to fit pipe.	h
4	3 in. (7.6 cm.) metal bolts with nuts.	i
2	wood to be shaped as plugs for strengthening the connection at upper ends of pipes "a".	

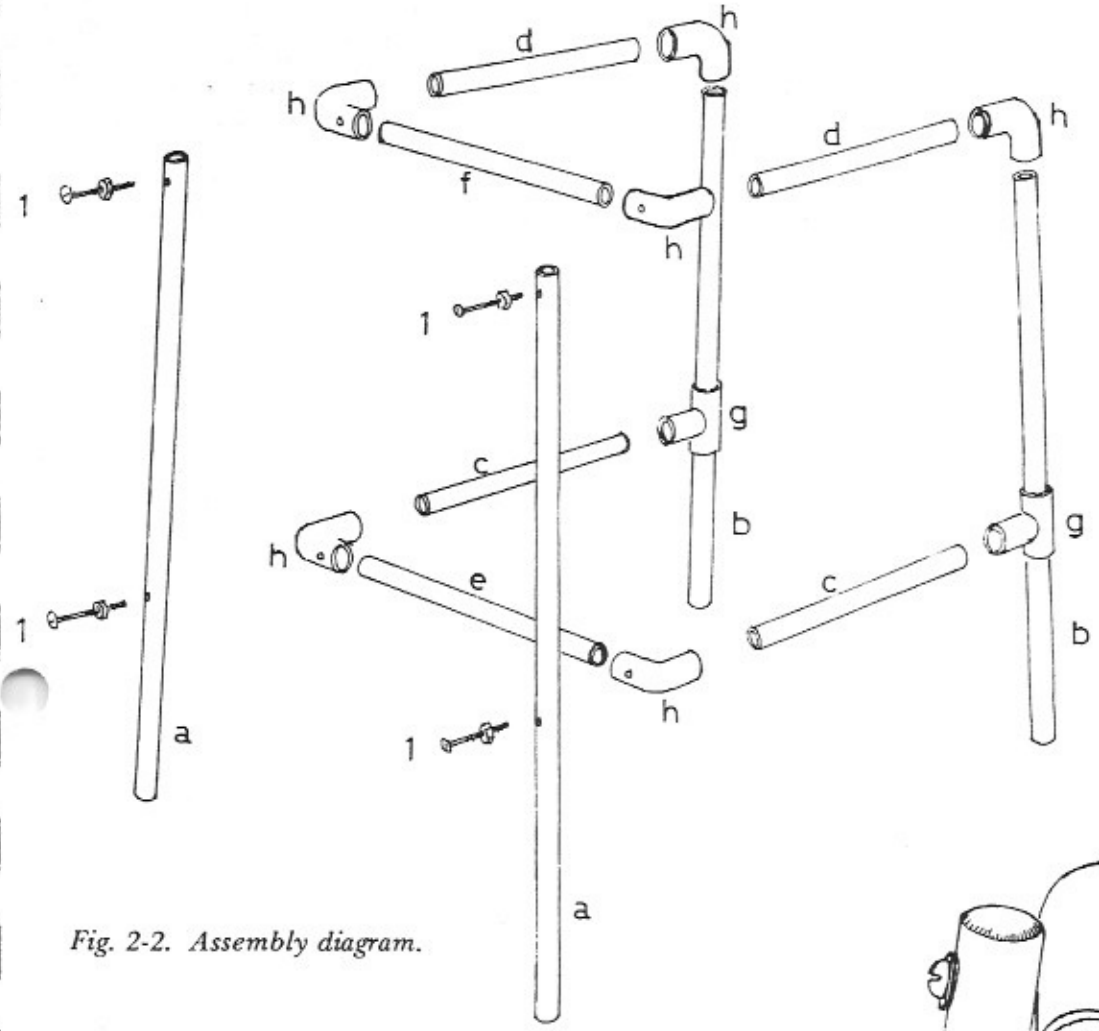


Fig. 2-2. Assembly diagram.

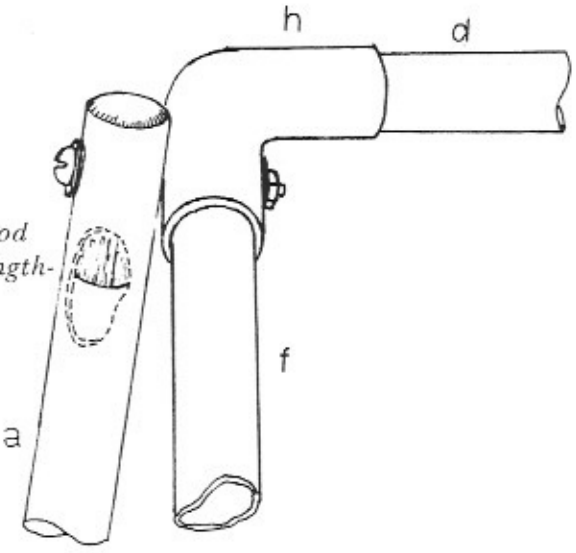


Fig. 2-3. Detail of bolting showing wood plug within pipe "a" for strengthening connection.

Variations:

Variation A: Height

This can be adjusted by using longer or shorter pieces for pipes "a" and pipes "b". (See Fig. 2-2.)

Variation B: Size of Pipe

Plastic pipe of different diameters is available and may be more suitable for some patients.

SECTION 3. FOUR-POINT CANE

PLASTIC PIPE FOUR-POINT CANE

Description and Uses:

This cane (Figs. 3-1 and 3-2) is modeled after a standard four-point cane and is useful for the hemiplegic or the ataxic patient. The cane is easy to construct from inexpensive plastic pipe.

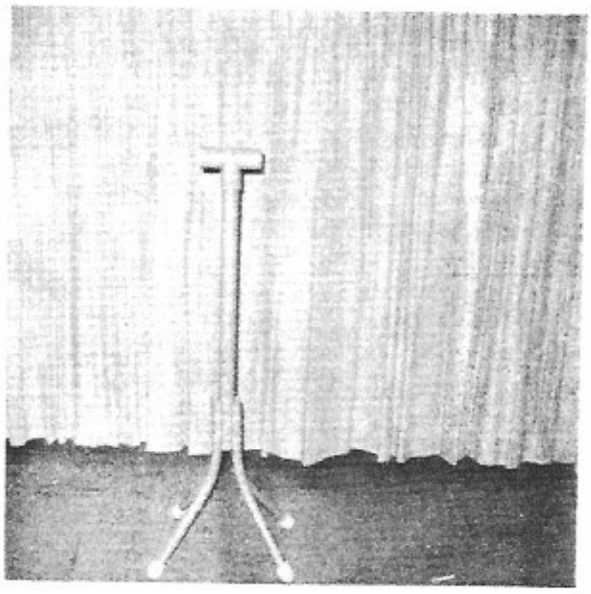


Fig. 3-1. Four-point cane.

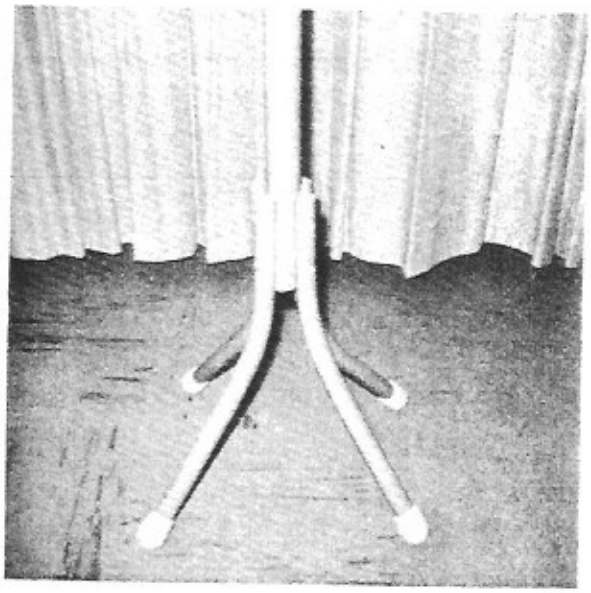


Fig. 3-2. Base of four-point cane.

Details of Construction: (Figs. 3-3 and 3-4)

MATERIALS AND INSTRUCTIONS

PLASTIC PIPE

Cutting Plan

1	1 1/4 in. (3.2 cm.) diameter pipe cut 23 1/2 in. (60 cm.) long.	a
4	3/4 in. (2 cm.) diameter pipe cut 16 in. (40.5 cm.) long, for the points. Bend pipes as needed after heating on a hot plate.	b,c,d,e
1	1 5/8 in. (4.2 cm.) diameter T-connector, for the handle	f

MISCELLANEOUS

4	rubber tips for chair-legs
4	3 1/4 in. (8.3 cm.) metal bolts with nuts

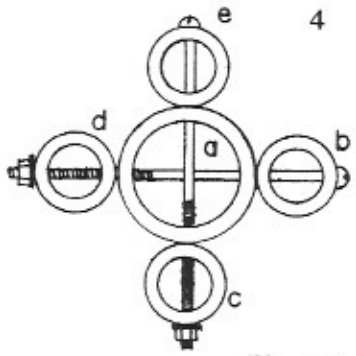


Fig. 3-3. Top view.

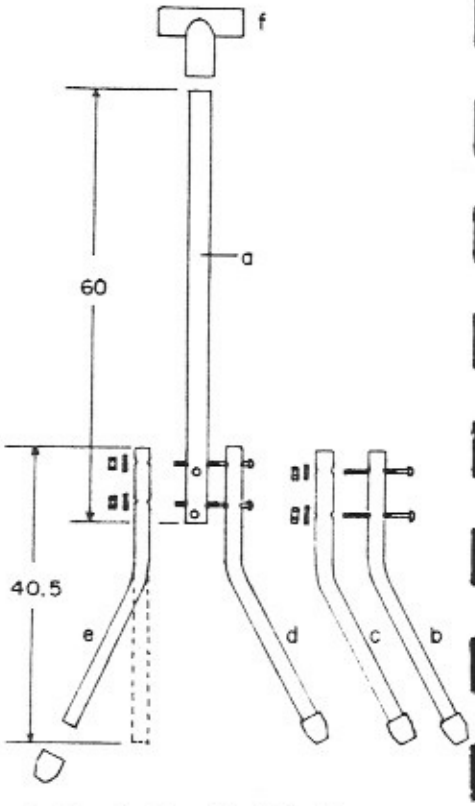


Fig. 3-4. Side view.

Variation: Height

The height of the cane is easily adjusted to that of the patient by altering the length of the long upright piece "a" in Fig. 3-4.

SECTION 4. PATIENT–LIFT

METAL PIPE-LIFT WITH SNAP SHACKLE

Description and Uses:

A simple pole made of metal pipe or other strong material may be used with a canvas seat to transport a handicapped patient (Fig. 4-1). The lift can be used to move a patient upstairs in places where there is no elevator.

Fig. 4-1. Patient being lifted from wheelchair.

Fig. 4-2. Patient with partially paralyzed upper extremities being moved from a wheel chair.

Details of Construction: (Figs. 4-3 through 4-9)

MATERIALS AND INSTRUCTIONS

SLING SEATS

Canvas or other heavy duty material. 2 1/2 yards (2.5 meters) of material 1 yard (1 meter) wide

Cutting plan

2	29 x 9 1/2 in. (72.5 x 43.8 cm.)	for back of sling seat.	a
2	32 x 13 in. (80 x 32.5 cm.)	for bottom of sling seat. Taper ends to width of 9 in. (22.5 cm.)	b
2	32 x 13 in. (80 x 32.5 cm.)	for bottom of commode sling seat. Taper ends to a width of 9 in. (22.5 cm.). Cut a hold in center 8 1/2 x 6 in. (21.3 x 15 cm.)	c

Flat Steel Bars

Cutting plan

2	7 in. (17.5 cm.) for back of sling seat. Drill a hole in center.	d
4	11 in. (27.5 cm.) for bottom of sling seat and commode sling seat. Drill a hole 1 in. (2.5 cm.) from each end.	e

Link Chain

Cutting plan (varies with size of chain and size of patient).

2	4 links long
12	7 links long

Save all cut links of chain, because they will be needed for connecting the chain again, as shown in Fig. 4-3.

Make French seams. Stitch the edges and ends of the canvas many times for reinforcement, as shown in the sketched pattern (Fig. 4-3,4-4). Reinforce the edges of the hole for the commode sling and bind with scraps of material. Insert steel bars "d" and "e" into folds in canvas. Then connect the chains to the bars by using the cut links and clamping them back into original shape.

PIPE AND ATTACHMENT

1	pipe 1 in. (2.5 cm.) in diameter, 5 ft. (152.5 cm.) long. Drill hole through the center of pipe for insertion of a shackle.	i
1	large snap shackle.	j
2	large spring snaps with swivel tops.	
2	pads, for use on ends of pipe for safety.	

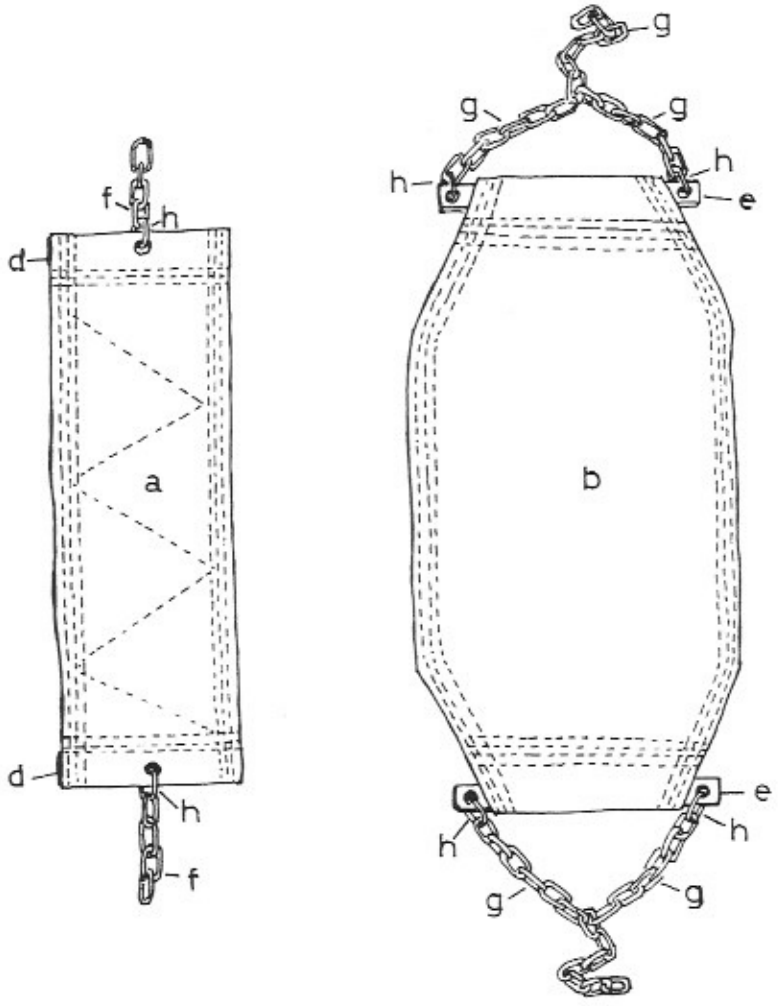


Fig. 4-3. Canvas sling seat.

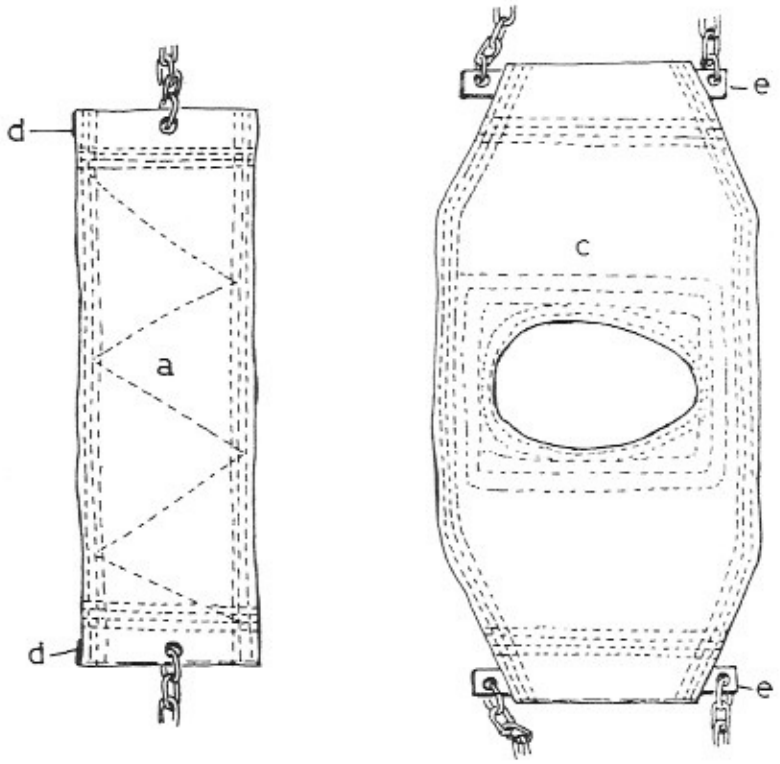


Fig. 4-4. Canvas sling commode seat.

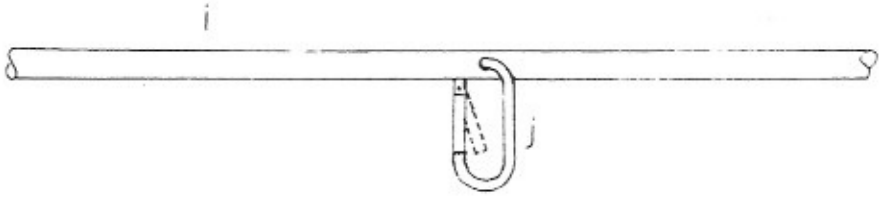


Fig. 4-5. Large snap shackle attached to pipe through a hole in the pipe.

Variation: Shackle and Two or Three Spring Snaps Used for Attachment to Pipe.

When a snap shackle of the type shown in Fig. 4-5 is not available, it is possible to use a standard large-size shackle and two (Fig. 4-6) or three spring snaps (Fig. 4-7 through 4-9) to attach the canvas seat to the pipe. The shackle must be attached by wire passed through a hole drilled in the pipe (Fig. 4-8)

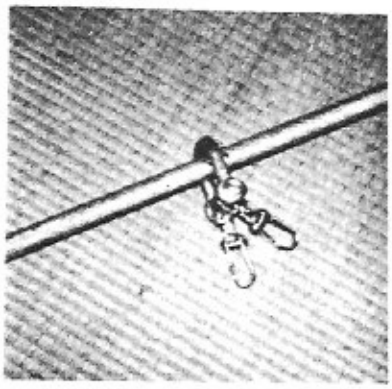


Fig. 4-6. Shackle used with two spring snaps.

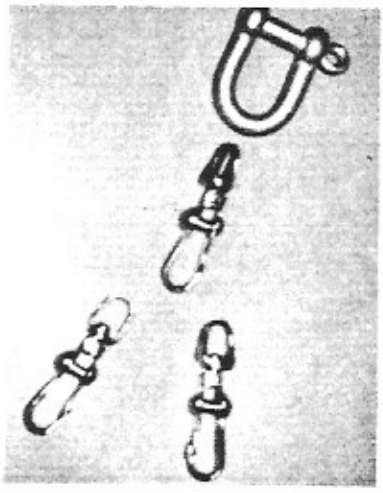


Fig. 4-7. Arrangement of shackle with three spring snaps for support of sling seat.

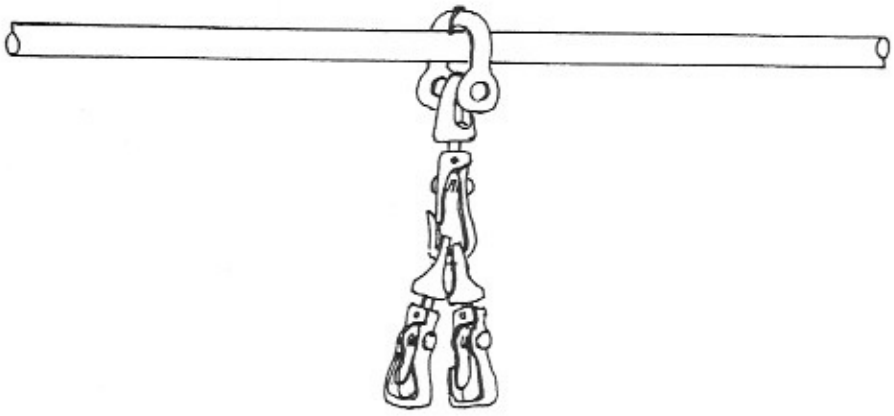


Fig. 4-8. Shackle attached to pipe by wire through a hole in the pipe.

Fig. 4-9. Canvas seat attached to pipe.

SECTION 5: COLLAPSIBLE WOODEN BEDS OF WHEELCHAIR-HEIGHT

BED WITH OVERBED FRAME, LONG TRAPEZE BAR, AND ELEVATING HEADREST

Description and Uses: (Figs. 5-1 through 5-11)

This bed offers an inexpensive method of obtaining an elevatable headrest and overhead frame for attachment of needed equipment. A long trapeze bar often is used by paraplegic patients in transfers to wheelchairs. By using this bar, a patient may easily transfer with assistance, even early in his illness (Fig. 5-2). Later in his illness he may be able to transfer unassisted (Fig. 5-3). A paraplegic patient with high-level spinal cord injury may have permanent need to use a long trapeze bar.

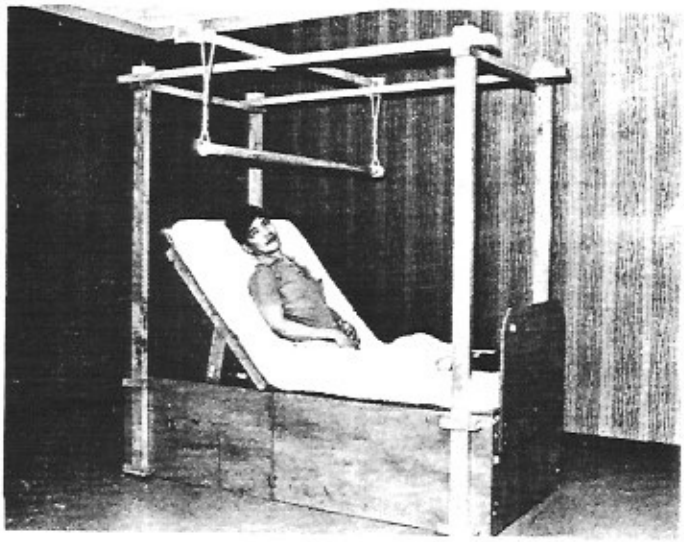


Fig. 5-1. Collapsible wooden bed of wheel chair-height with overbed frame, long trapeze bar, and elevating headrest.

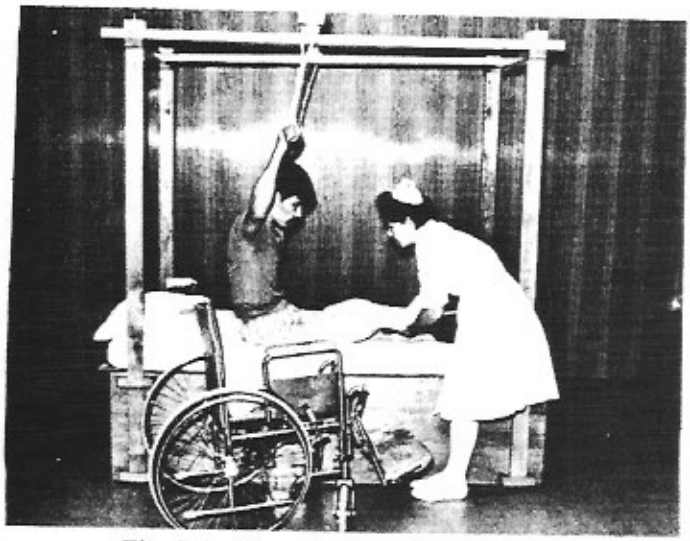


Fig. 5-2. Paraplegic patient transferring to wheelchair with slight assistance from nurse.

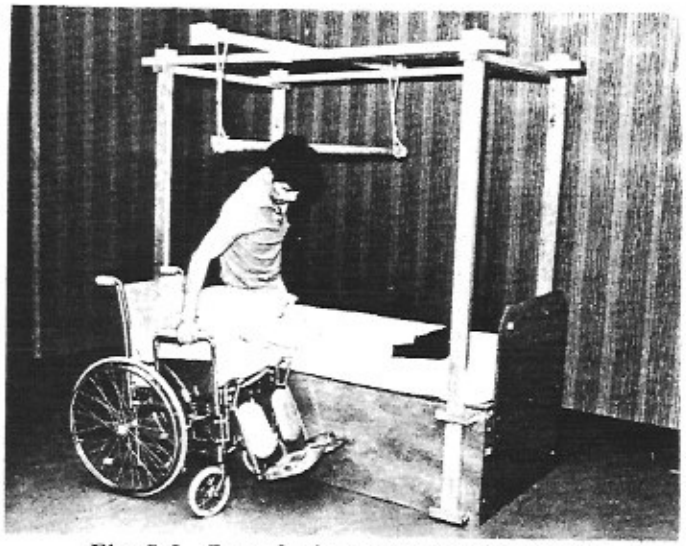


Fig. 5-3. Paraplegic patient transferring to wheelchair unassisted.

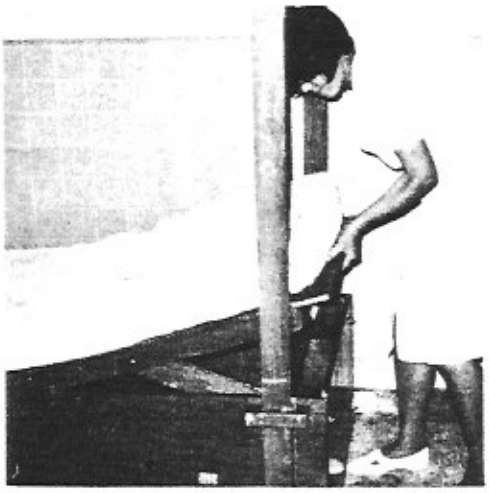


Fig. 5-4. Method of elevating headrest of bed.

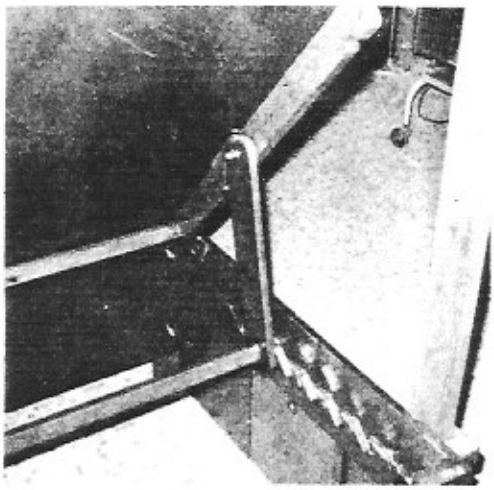


Fig. 5-5. Mechanism of support for elevating headrest.

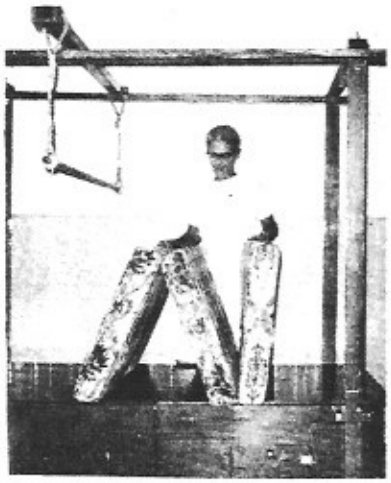


Fig. 5-6. Folding imitation foam-rubber "shikifuton" used as mattress for bed.

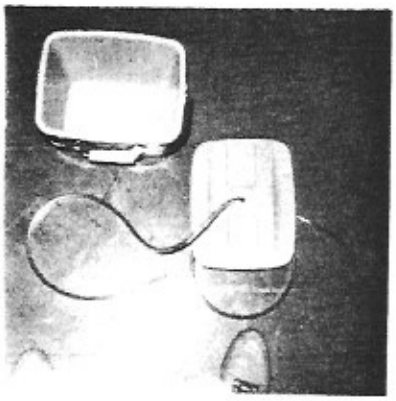


Fig. 5-7. Plastic bucket and lid used as a urine-collection container.

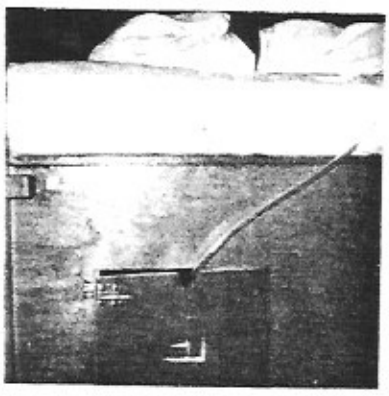


Fig. 5-8. Door at side of bed, showing urine-drainage tube leading to urine-collection container.

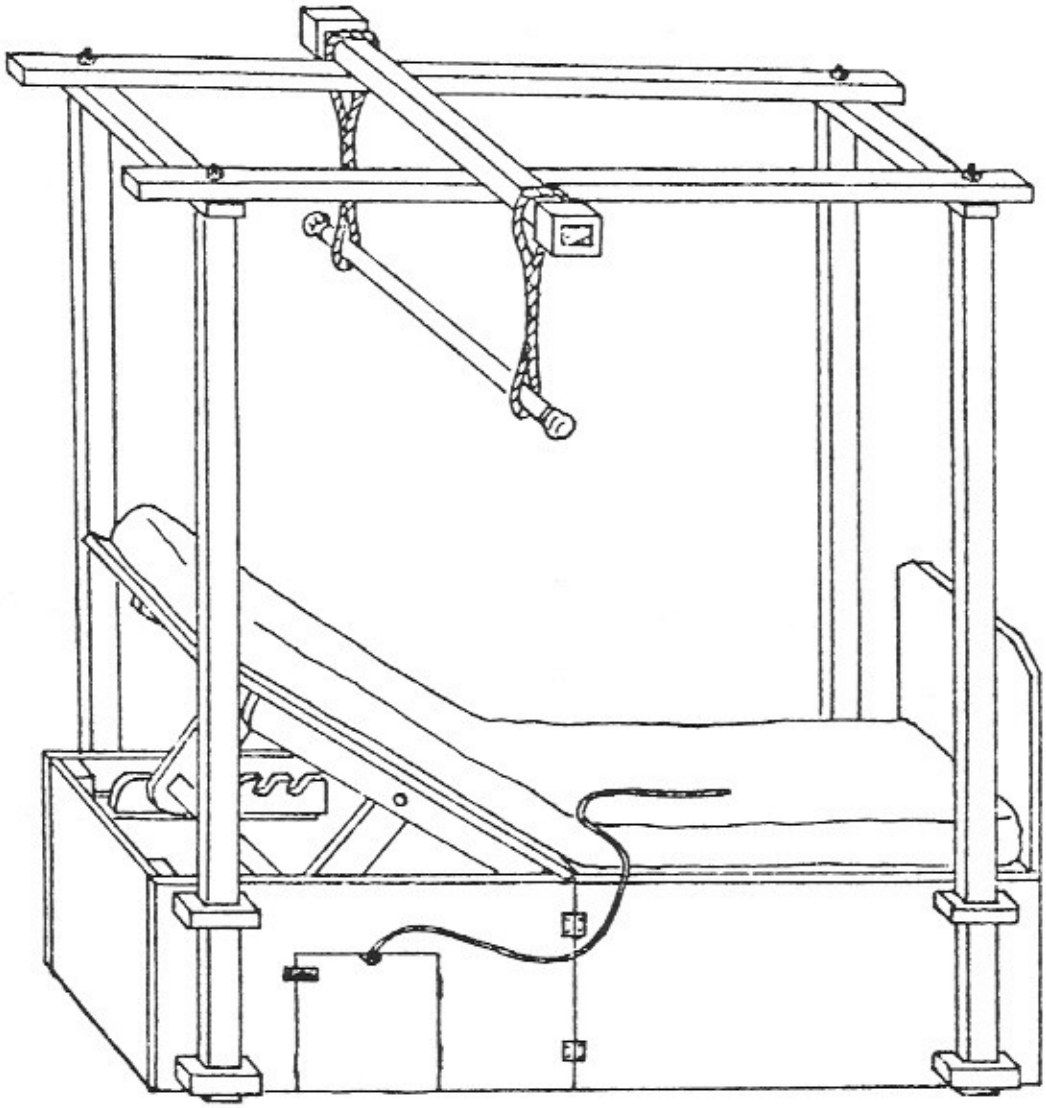


Fig. 5-9. Side view.

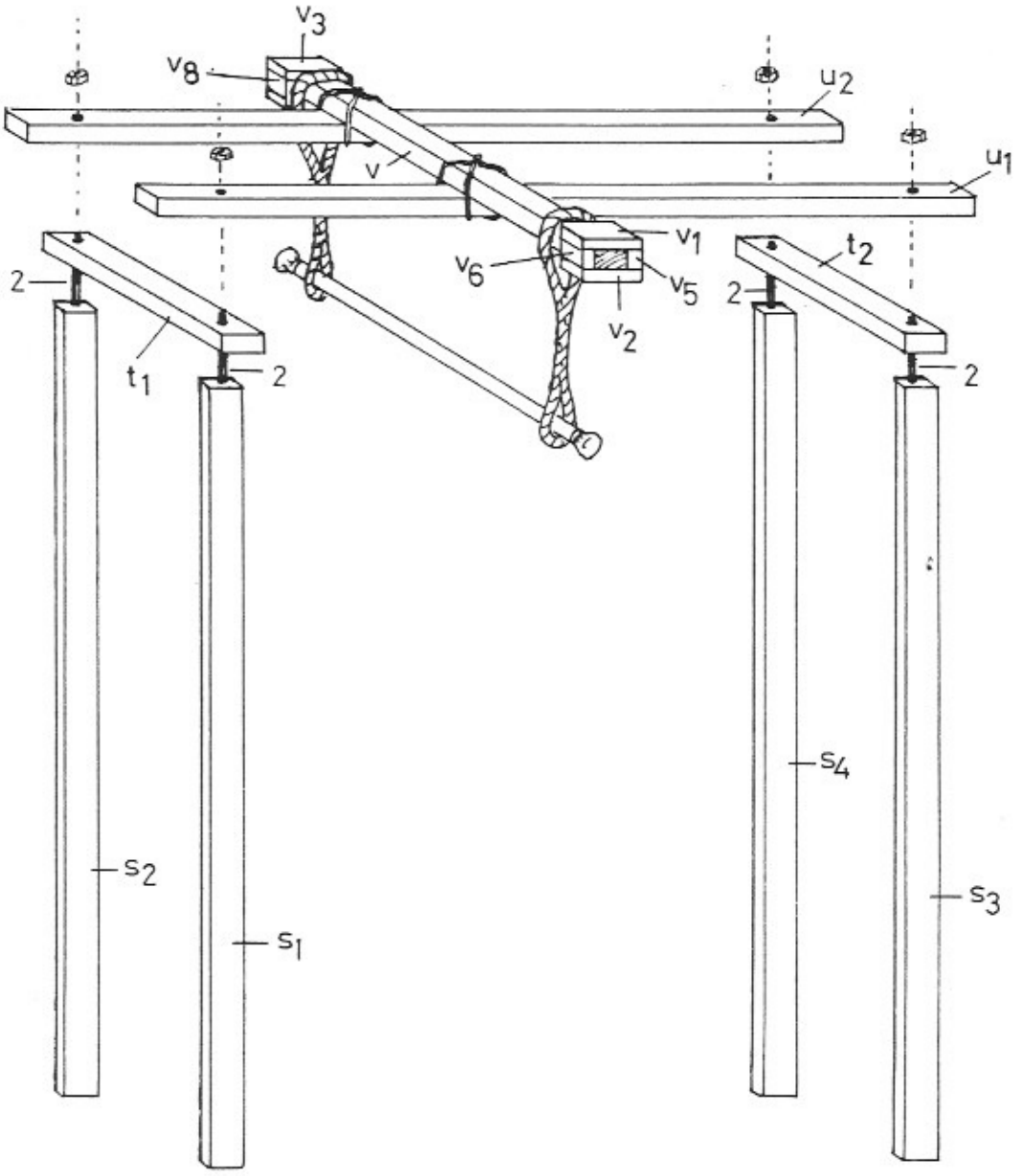


Fig. 5-10. Diagram showing sequence of adding or removing overbed parts of collapsible bed.

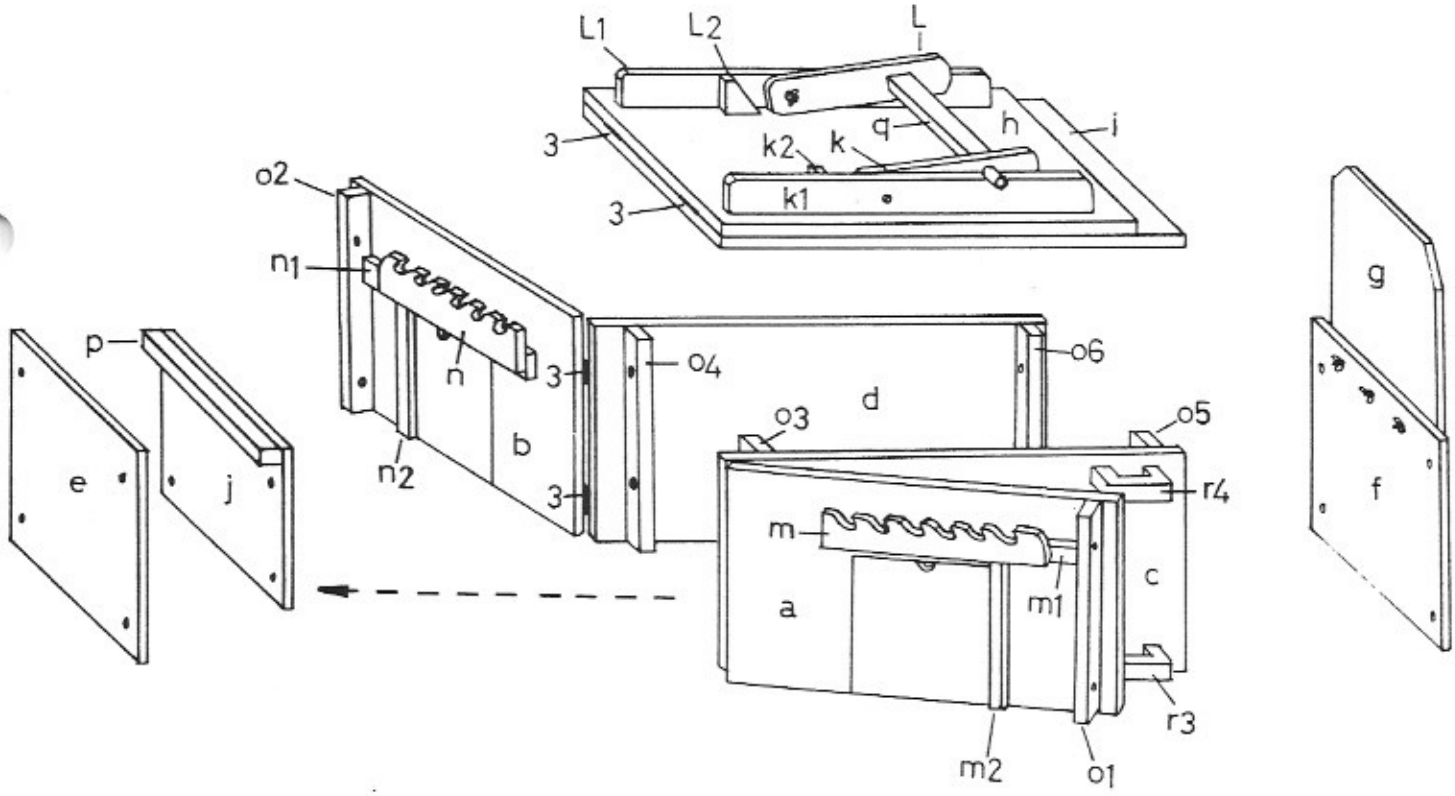


Fig. 5-11. Diagram showing sequence of adding or removing frame-parts of collapsible bed.

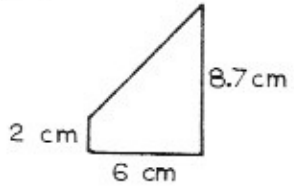
Details of Construction: (Figs. 5-12 through 5-20)

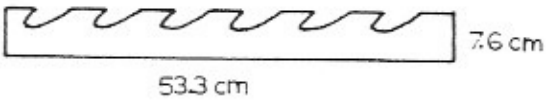
MATERIALS AND INSTRUCTIONS

LUMBER

5/8 in. (1.6 cm.) Plywood

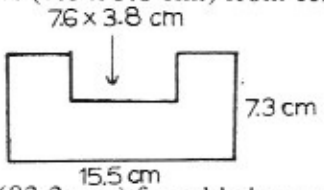
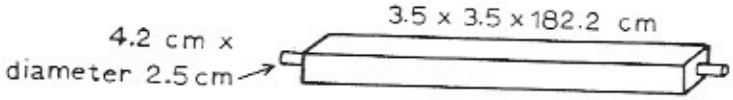
Cutting Plan

2	32 3/4 x 18 3/4 in. (83.2 x 47.6 cm.)	for head and foot.	e and f
1	29 1/2 x 21 3/4 in. (75 x 55.2 cm.)	for footboard. Round off two corners.	g
2	35 x 18 3/4 in. (88.9 x 47.6 cm.)	for sides with door. Cut door 12 x 12 in. (30.5 x 30.5 cm.) Cut small notch in top of door for urine tube.	a and b
2	40 x 18 3/4 in. (101.6 x 47.6 cm.)	for sides without door.	c and d
1	37 x 34 in. (94 x 86.3 cm.)	for top at head of bed.	h
1	40 x 34 in. (101.6 x 86.3 cm.)	for top at foot of bed.	i
1	32 3/4 x 14 in. (83.2 x 35.5 cm.)	for support of top at center.	j
2	18 x 3 in. (45.7 x 7.6 cm.)	for top lifter arms. Round off corners. Drill 1 in. (2.5 cm.) hole near one end for insertion of "q". Drill small hole near other end for bolt to attach to "k_1" ("l_1"). (Arm swings by these wing nut bolts.)	k and l
2	3/4 x 2 3/8 x 3 3/8 in. (2 x 6 x 8.7 cm.)	stops for lifter arms. 	k_2 and l_2

2	21 x 3 in. (53.3 x 7.6 cm.)	for lifter holder. Make notches to hold "q". 	m and n
2	24 x 2 in. (61 x 5.1 cm.)	for spacers for notched bars.	m_1 and n_1
2	13 x 1 1/2 in. (33 x 3.8 cm.)	for support for notched boards.	m_2 and n_2
4	3 x 2 1/8 in. (7.6 x 5.4 cm.)	for stop on end of overbed holder bar.	v_1 through v_4
4	2 1/8 x 2 in. (5.4 x 5.1 cm.)	for stop on end of overbed bar holder.	v_5 through v_8

1 3/8 x 2 7/8 in. (3 x 7.3 cm.) Lumber

Cutting Plan

6	18 3/4 in. (47.6 cm.) for stabilizing bed corners.	o_1 through o_6
2	32 1/4 in. (82 cm.) holder for lifter arms. Make notch near one end to support lifter arm when not in use.	k_1 and l_1
2	36 1/2 in. (92.7 cm.) support for top (foot) of bed.	w_1 and w_2
8	6 1/8 in. (15.5 cm.) for supports for upright bars. Cut out a hole 3 x 1 1/2 in. (7.6 x 3.8 cm.) from center to hold upright bars. 	r_1 through r_8
1	32 3/4 in. (83.2 cm.) for added support with "j".	p
1	32 1/2 in. (82.5 cm.) for lifter arm cross bar. Cut to 1 3/8 x 1 3/8 in. (3.5 x 3.5 cm.) by splitting lumber. Round 1 5/8 in. (4.2 cm.) off each end to 1 in. (2.5 cm.). 	q

4	71 3/4 in. (182.2 cm.)	for upright bars.	s_1 through s_4
2	39 3/8 in. (100 cm.)	for head and foot overhead bars.	t_1 and t_2
2	74 3/4 in. (189.8 cm.)	for side overhead bars.	u_1 and u_2

2 x 1 5/8 in. (5 x 4 cm.) Lumber

Cutting Plan			
1	59 1/2 in. (149.8 cm.)	for overhead lifter or bar holder.	v

HARDWARE

17	2 1/2 in. (6.3 cm.) metal bolts with wingnut and 2 washers each, for putting bed together.	1
4	6 in. (15.2 cm.) metal bolts with wingnut and 1 washer each for putting overhead bars together.	2
10	2 in.(5 cm.) hinges for folding sides, top and doors.	3
2	2 in. (5 cm.) sliding latches for doors.	4
2	2/8 in. (0.6 cm.) rope 36 in. (92 cm.) in length to tie cross bar to longitudinal bars.	5

FINISH

Sandpaper	Wood stain	Varnish
Paint brushes	Wood filler	

URINE-DRAINAGE

Condom-drainage (described on pages 46 through 49), indwelling catheter, or suprapubic catheter.

Glass adapter for connection of catheter or condom-drainage to plastic tubing.

Plastic tubing.

Plastic bucket with cover. Drill hole in top to permit insertion of plastic tubing.

MATTRESS

Twin-bed size; foam-rubber, or tacked cotton with no innerspring, or imitation foam-rubber mattresses are adequate.

A three-section, collapsible, "shikifuton" of imitation foam-rubber, size 35 x 76 in. (90 x 193 cm.), as shown in Fig. 5-6 is very satisfactory. This can be purchased at most futon stores in Okinawa and Japan.

LONG TRAPEZE BAR OVERBED

2	3/8 in. (1 cm.) manila rope for tying pipe to sides of overbed bars.	x_1 and x_2
1	2 in. (5 cm.) diameter pipe 55 in. (141 cm.) long. Drill a hole in each end to secure rope to pipe with nylon cord.	y
	Nylon cord used to attach rope securely to pipe.	z_1 and z_2
	Wire	
	Adhesive tape	
	Sponge-rubber or other padding, for the ends of the bars. Hold padding to bar with the adhesive tape.	

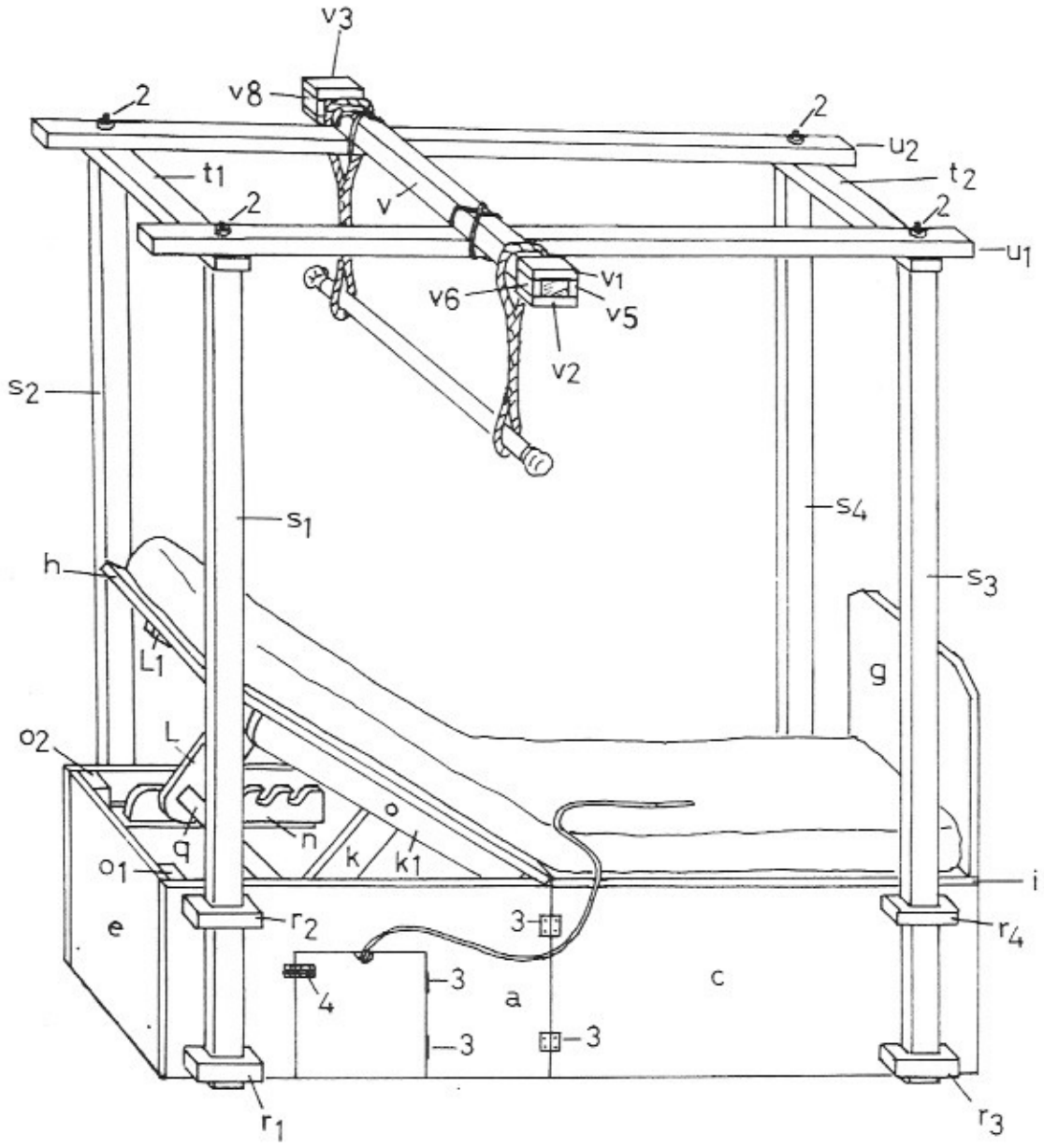


Fig. 5-12. Bed parts.

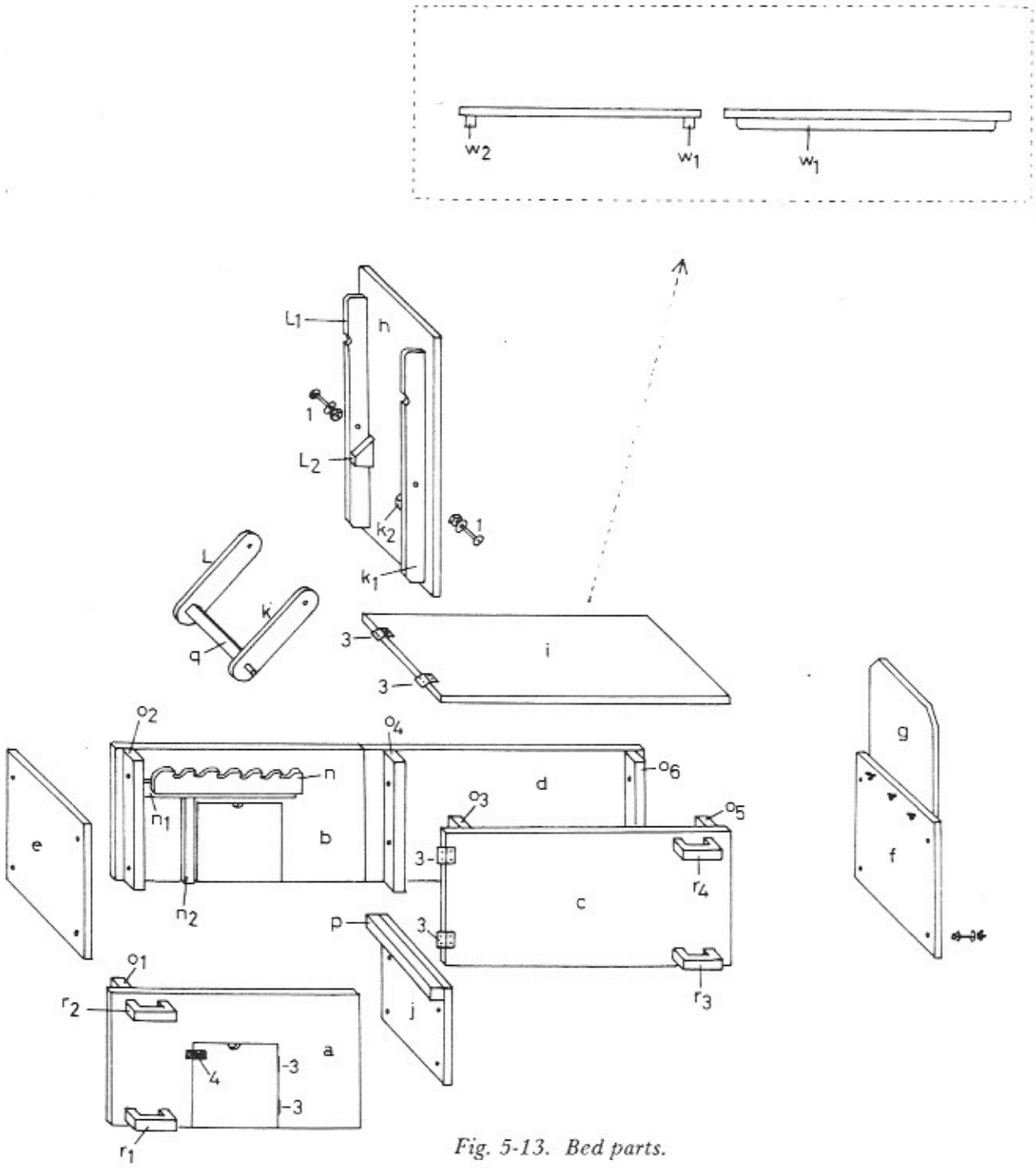


Fig. 5-13. Bed parts.

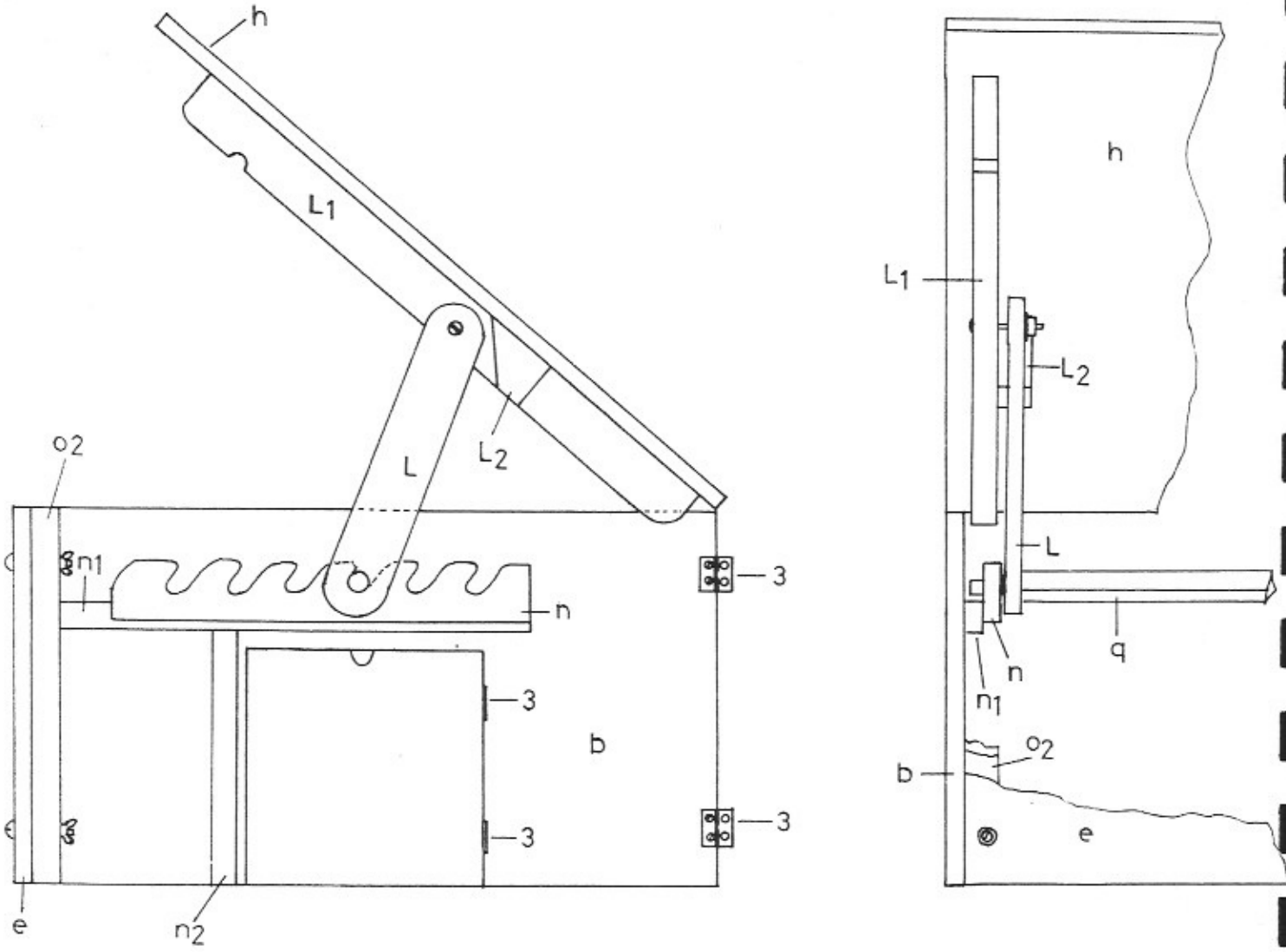


Fig. 5-14. Elevating headrest parts.
Left: View from inside bed.
Right: View from head of bed.

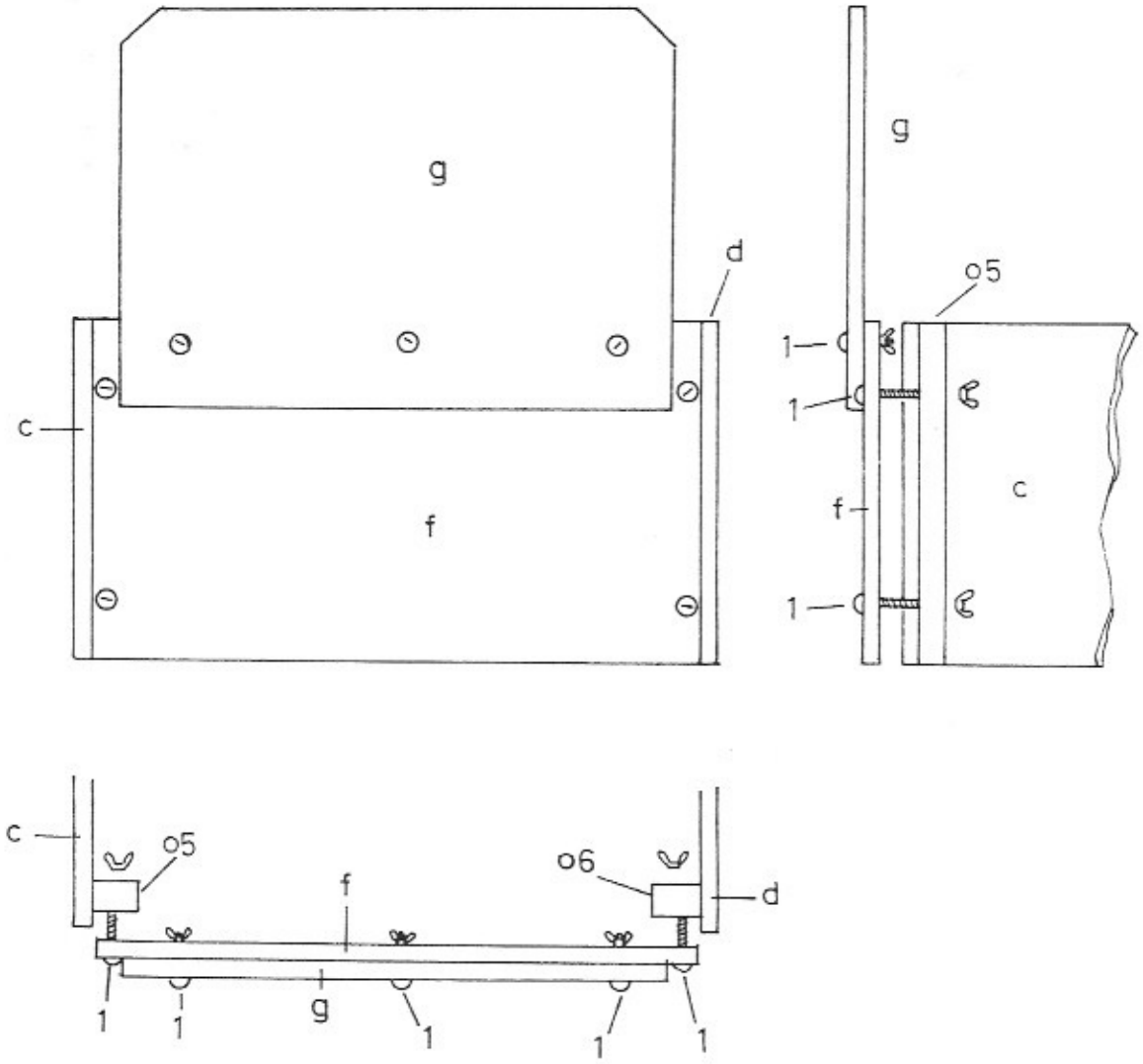


Fig. 5-15. Construction diagrams of foot of bed. The head of bed is made in the same way, except that there is no part "g". Top left: View from foot of bed. Top right: View from inside bed. Bottom: View from above bed.

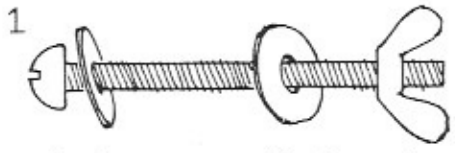


Fig. 5-16. Wing-nut bolt used to fasten parts of bed together, so that it is easily disassembled.

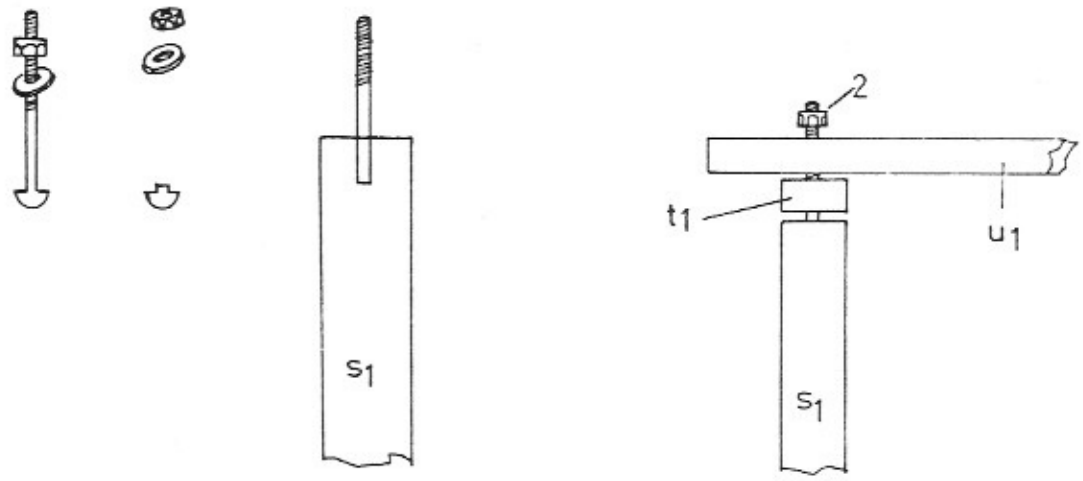


Fig. 5-17. Side view of top section of overbed frame.

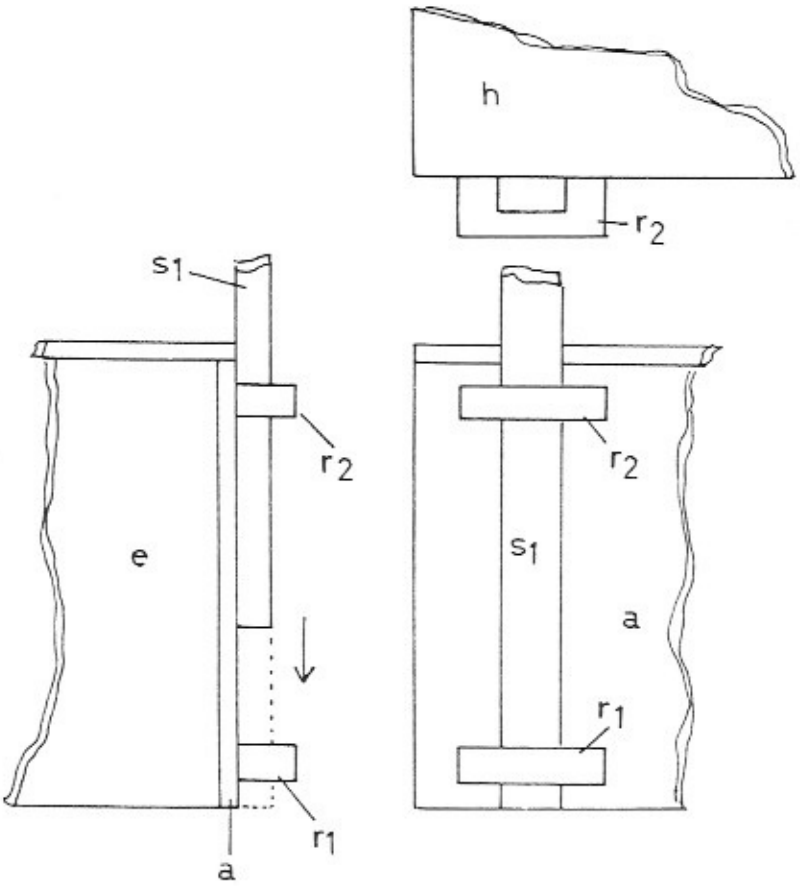


Fig. 5-18. Bottom section of overbed frame. Top: View from overbed area. Bottom left: View from head of bed. Bottom right: Side view.

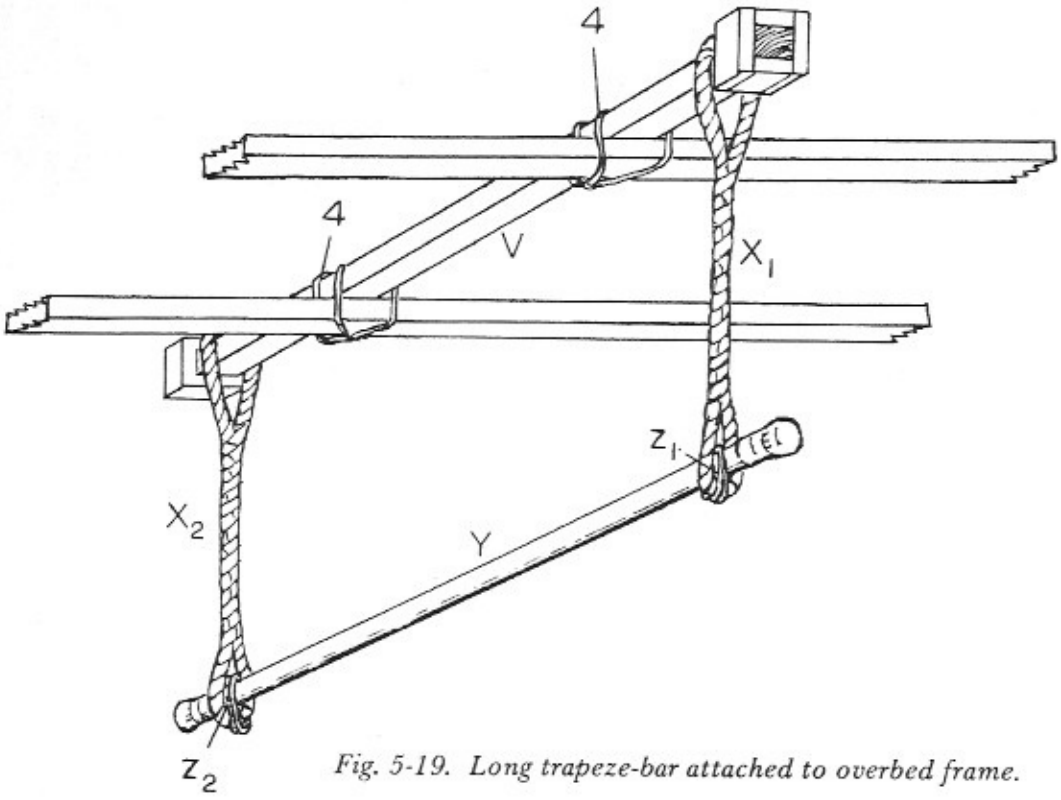


Fig. 5-19. Long trapeze-bar attached to overbed frame.

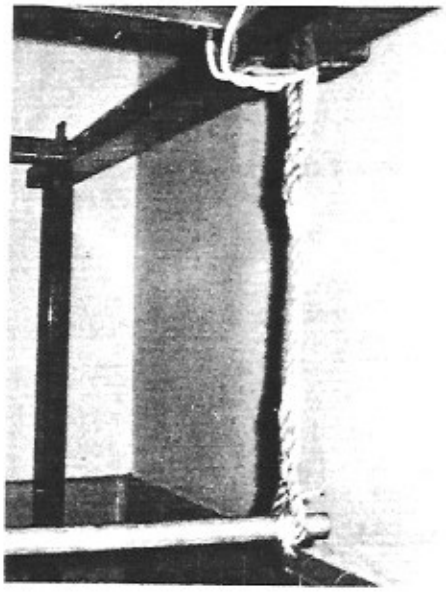


Fig. 5-20. Details of attachment of pipe to overbed frame. Ropes can be secured as shown in the preceding diagram, or they can be tied with square knots and the ends bound with adhesive tape, as shown in this picture. Prevent the rope from slipping off the end of the pipe by tying the rope in place with a nylon cord. Run the nylon cord through a hole drilled in the pipe.

Variations:

Variation A. Used with Short Overbed Trapeze Bar (Figs. 5-21 through 5-23)

A conventional-size trapeze bar can be constructed from 1/2 in (1.3 cm.) pipe 7 inch (17.7 cm.) in length and 1/4 in. (.7 cm.) rope 50 in. (126.5 cm.) long.

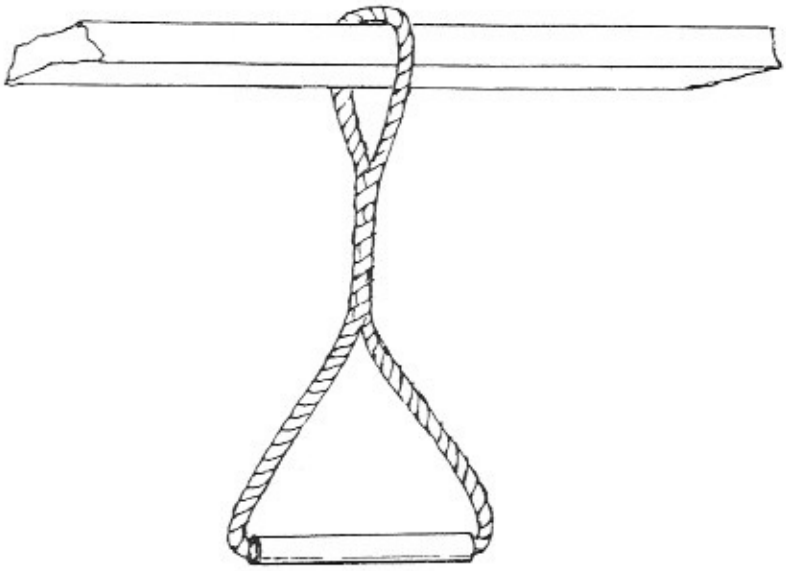


Fig. 5-21. Short trapeze bar attached to overbed frame. Rope can be fastened as shown in drawing, or it can be tied with square knots and the ends held down with adhesive tape.

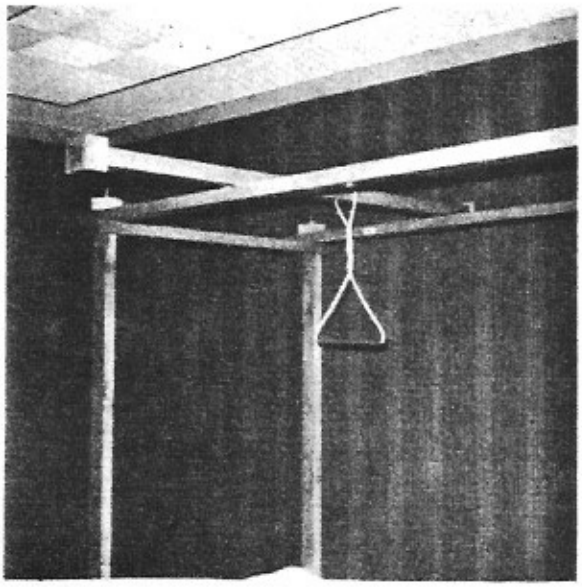


Fig. 5-22. Short trapeze bar attached to overbed frame.

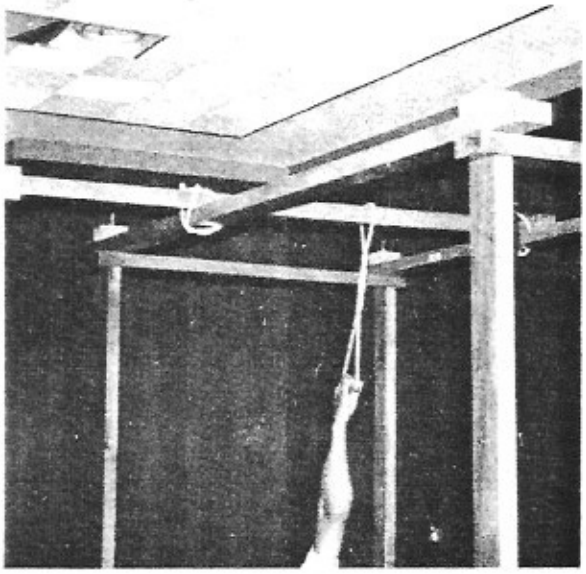


Fig. 5-23. Patient using short trapeze bar.

Variation B. Used with Pulley Lift (Figs. 5-24 through 5-30).

The overbed frame can be used as a support for a lifter for severely paralyzed patients. To make the lift, a boat ratchet-wrench (Fig. 5-28), a garage-door track (Fig. 5-29), and a conventional cloth sling-seat (see pages 15 and 16) are used.

This is an inexpensive and easily constructed means for lifting patients which can be used by nurses and invalids' families.

This pulley lift can also be used on any commercial Balkan-type overbed frame.

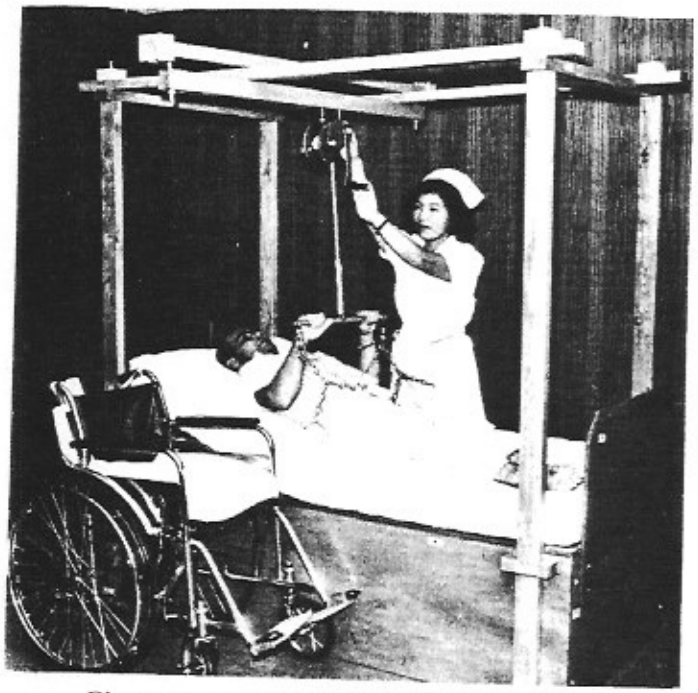
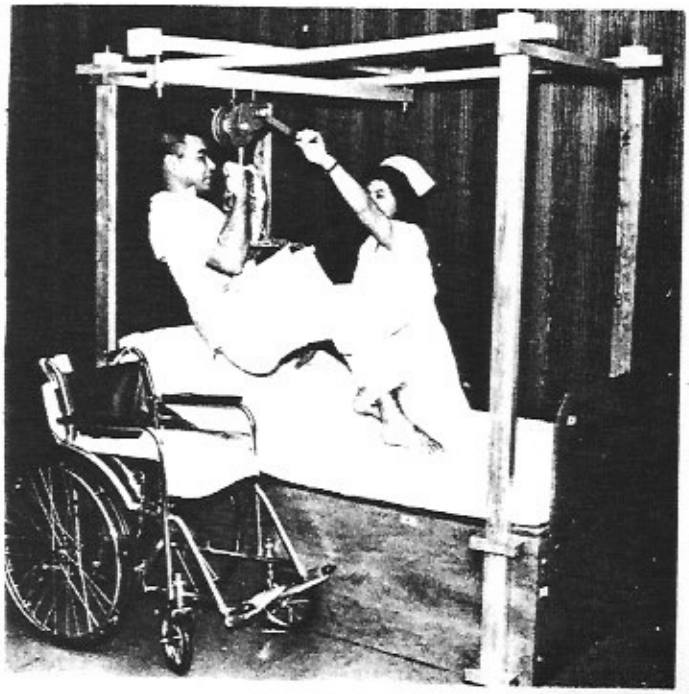


Fig. 5-25. Nurse lifting patient for transfer to wheelchair. The patient in this picture is holding the bar but this is not necessary.

Fig. 5-24. Patient in position to be lifted to a wheelchair. The patient in this picture is holding the bar, but this is not necessary.



MATERIALS AND INSTRUCTIONS

WINCH AND TRACK (Figs. 5-27 through 5-30)

1	garage-door metal track, cut 55 in. (139.8 cm.) long.	a
2	1/2 in. (1.3 cm.) diameter, 8 in. (20.3 cm.) long metal bolts with 2 washers each and wing nuts for each.	b
1	rachet-winch. (Winch Model 6810 made by Dutton Lainson Co., Hastings, Nebraska, can be obtained from Pan-Pacific Co., P. O. Box 16, Kadena, Okinawa, for $11.75.)	c
2	ball-bearing garage-door hangers.	d
5 feet (152.5 cm.) of 1/2 in. (1.3 cm.) manila rope.		e
3/4 in. (2 cm.) pipe cut 18 in. (45.7 cm.) long. Drill hole at center and 1/2 in. (1.3 cm.) from each end.		f
2	spring snaps with swivel tops.	g
Wire		

Attach metal track to cross-bar on bed by drilling holes in track and wooden bar and securing with large bolts. Attach ball-bearing rollers to winch by drilling holes in winch-base and bolting on rollers. Secure rope to winch by screw fastenings on the winch, and use wire to fasten other end to pipe at center for spreader-bar. Wire spring snaps to each end of pipe. Slide winch device into metal track and tighten the retaining bolts.

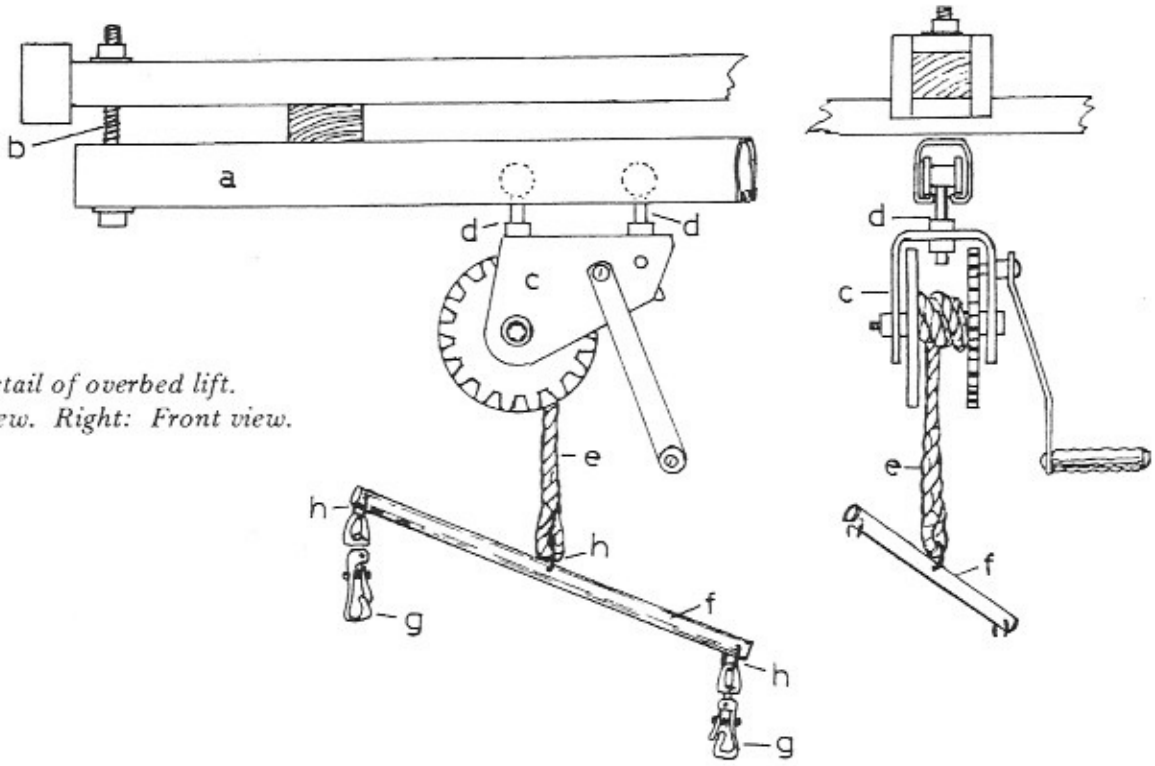


Fig. 5-26. Detail of overbed lift.
Left: Side view. Right: Front view.

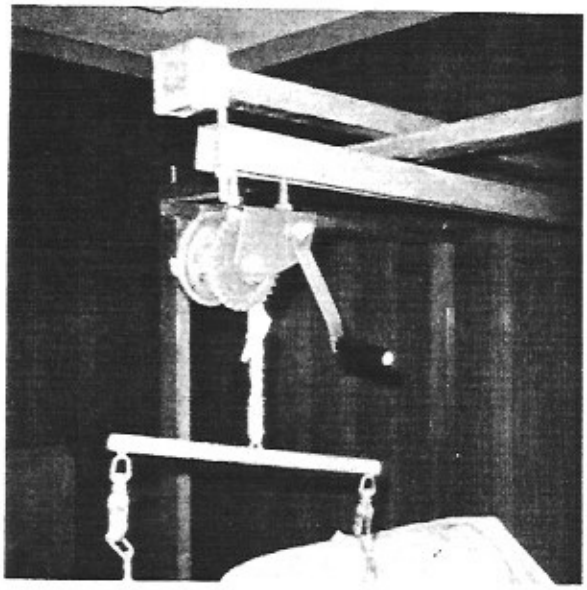


Fig. 5-27. Overbed lifter attached to bed.

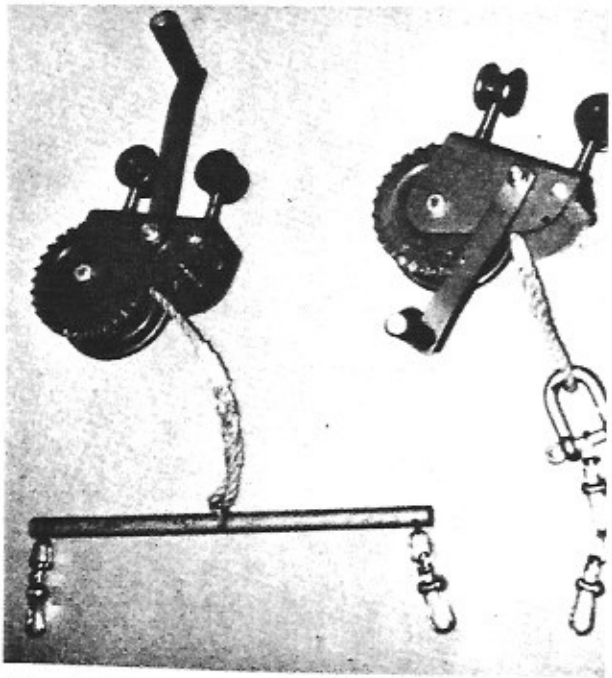


Fig. 5-28. Two possible methods for attaching canvas sling to the pulley. Left: A spreader bar with two spring snaps (the materials and instructions for this spreader bar are listed on page 37). Right: A shackle with 3 spring snaps.

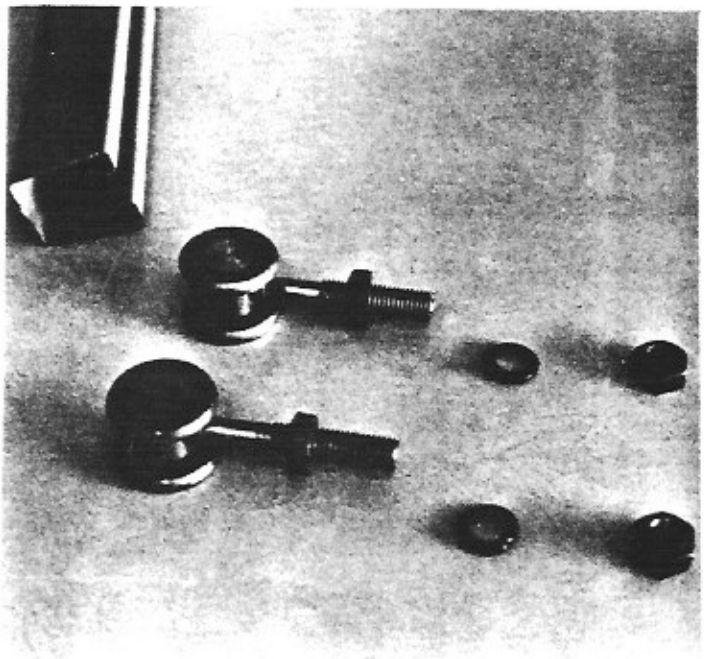


Fig. 5-29. Garage-door track and two ball-bearing garage-door hangers.

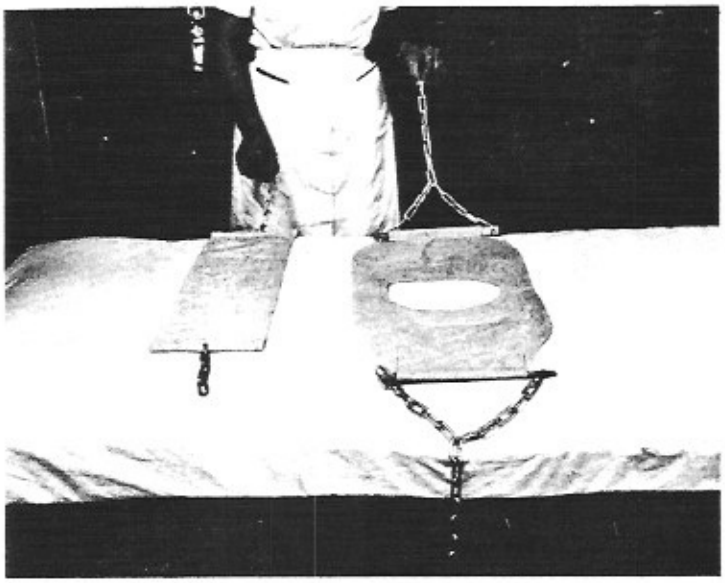


Fig. 5-30. Position of canvas sling for lifting patient.

Variation C. Bed Used Without Overbed Frame (Fig. 5-31).

Fig. 5-31. Method of elevating head of bed.

COLLAPSIBLE WHEELCHAIR-HEIGHT WOODEN BED WITHOUT ELEVATING HEADREST

Description and Uses:

This bed can be used with a mattress (Fig. 5-32) or with a tatami mat (Fig. 5-33). It is easily collapsible and can be placed flat against a wall when it is not needed (Fig. 5-36).

Patients who need a bed at their place of work for any reason, may wish to have a bed of this type constructed.

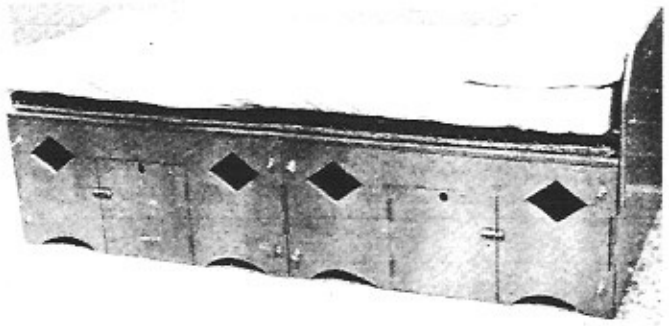


Fig. 5-32. Collapsible bed, used with folding mattress. (See page 21 for picture of mattress.)

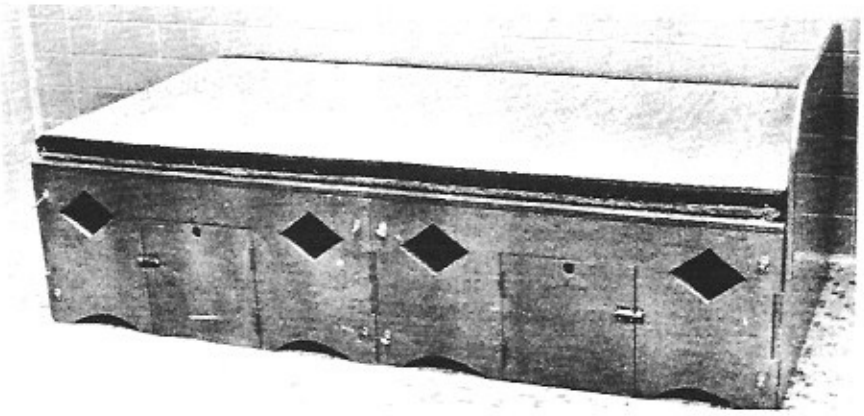


Fig. 5-33. Collapsible bed, used with tatami as a mattress.

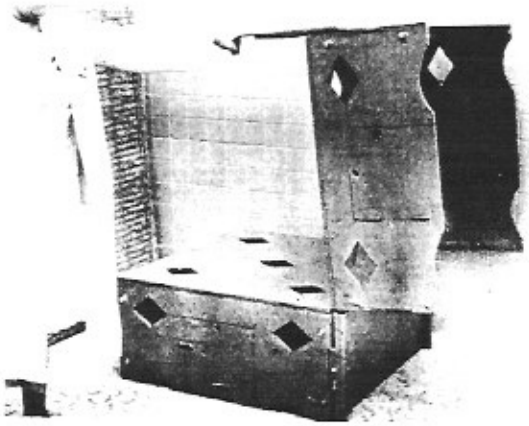


Fig. 5-34. Bed being collapsed.

Details of Construction: (Figs. 5-35 and 5-37)

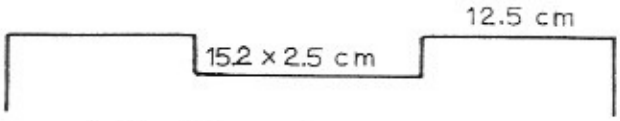
MATERIALS AND INSTRUCTIONS

LUMBER

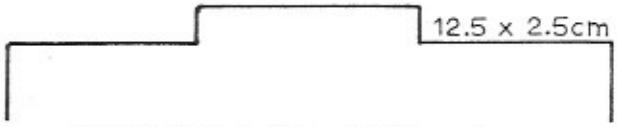
5/8 in. (1.6 cm.) Plywood

Cutting Plan

4	36 x 16 in. (91.5 x 40.6 cm.)	for sides. Cut out a door 12 in. x 12 in. (30.5 x 30.5 cm.). At 5 in. (12.5 cm.) from top at each end, cut a notch 6 in. x 3/4 in. (15.2 x 2.5 cm.).	a, b, c, d



3	35 3/4 x 16 in. (90.8 x 40.6 cm.)	for head, foot, and center support. Cut off side edges 5 in. x 3/4 in. (12.5 x 2.5 cm.) to fit into notches on sides.	e, f, j



1	36 x 15 in. (91.5 x 38 cm.)	for footboard. Round off top corners.	g
8	16 x 1 1/2 in. (40.6 x 3.8 cm.)	for corner and center supports.	h_1 through h_8
2	36 x 36 in. (91.5 x 91.5 cm.)	for top pieces of bed.	h, i

HARDWARE

20	2 1/2 in. (6.3 cm.) metal bolts with wingnut and 2 washers each, for putting bed together.	1
18	2 in. (5 cm.) hinges for folding sides, top and doors.	2
4	2 in. (5 cm.) sliding latches for doors.	3

MISCELLANEOUS

Nails	Wood filler	Wood glue
Wood stain	Sand paper	Varnish
Paint brush		

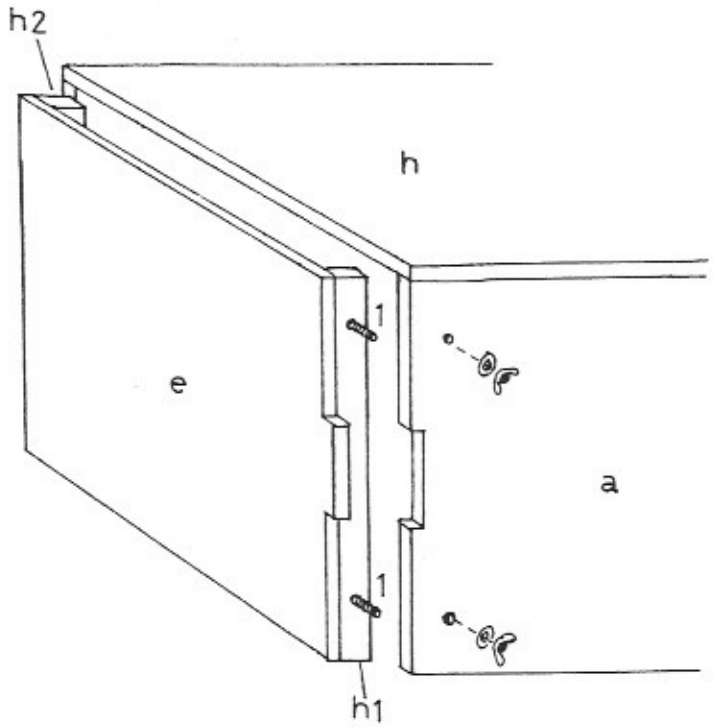


Fig. 5-35. Construction diagram.
The first step for collapsing the bed can also be seen in this diagram.

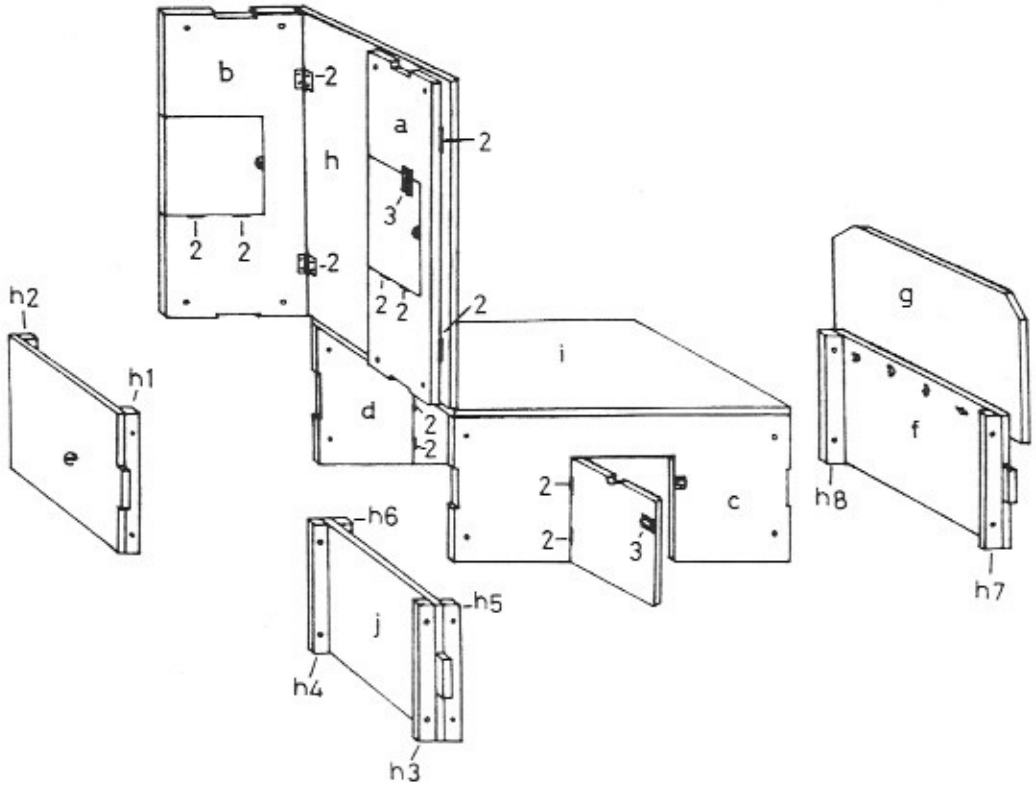


Fig. 5-36. Construction diagram.
The method of collapsing the bed can also be seen in these diagrams.

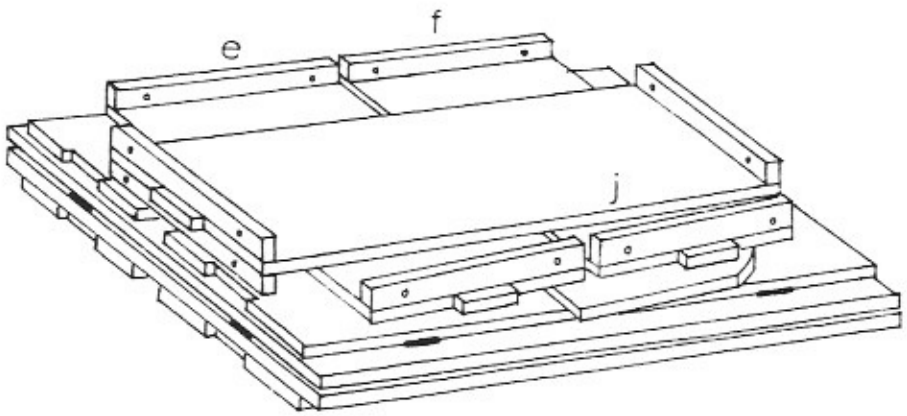


Fig. 5-37. Bed in collapsed condition, with center piece (j) and end pieces (e and f) placed on top of folded section

SECTION 6. CONDOM URINE-DRAINAGE SYSTEM

MODIFICATION OF CONVENTIONAL CONDOM URINE-DRAINAGE SYSTEM

Description and Uses:

Condom-drainage* is used frequently in rehabilitation to catch the urine of incontinent male patients (Fig. 6-1 through 6-4). If the hard-rubber ring is cut from the top of a condom (Fig. 6-6, step 5) before it is used for urinary-tract drainage, it can be attached more easily and securely. The condom must be partially re-rolled before it is applied. The soft, loose roll thus produced (Figs. 6-6, step5) can be easily attached to a penis with regular adhesive tape.

Fig. 6-1. Patient using condom-drainage and leg urinal-bag.

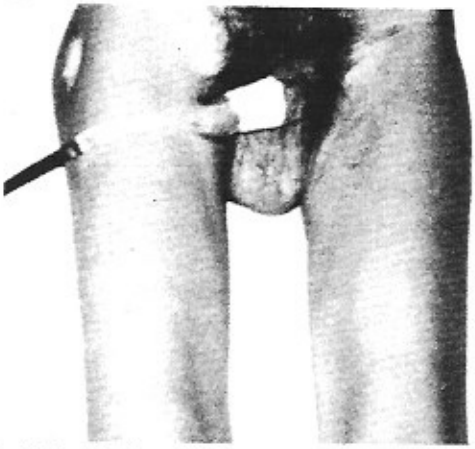


Fig. 6-2. Patient using condom-drainage connected to a bedside container.

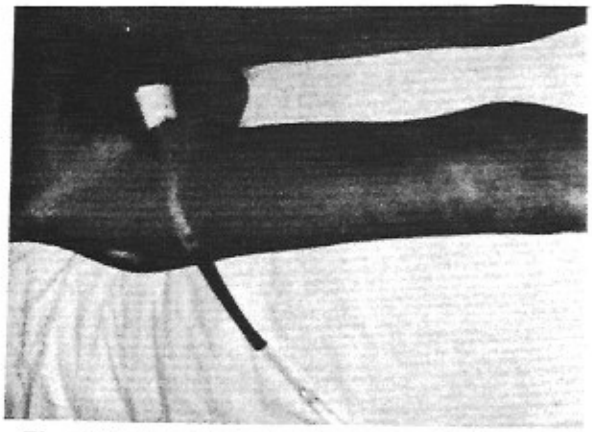


Fig. 6-3. Condom-drainage showing rubber tubing, glass adapter, and plastic tubing leading to bedside drainage-container.

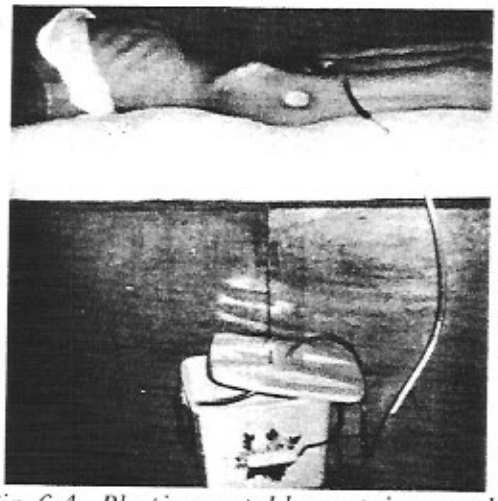


Fig. 6-4. Plastic vegetable-container used to collect urine.

* A description of conventional condom-drainage is given in the pamphlet "Care of Patients with Bowel and Bladder Problems: A Nursing Guide", by Doris A. Bergstrom, B.S.N., with assistance of Beth Grendahl, American Rehabilitation Foundation, Minneapolis, Minnesota.

Details of Construction (Figs. 6-5 and 6-6)

The following drawings (Figs. 6-5 and 6-6) show a conventional method for making a condom-drainage plus a modification step (Step 5). The modification step (which was developed by a patient at Okinawa Central Hospital) is enclosed in a black border.

MATERIALS AND INSTRUCTIONS

1	condom; inexpensive, heavy-weight brands are best.	a
3	3/4 in. (1.9 cm.) wide strips of adhesive tape; each strip is approximately *6 in. (15 cm.) long.*	b
1	6-to-8 in. (15-to-20 cm.) strip of rubber intravenous tubing for attaching condom to glass adaptor.	c
1	piece of plastic intravenous tubing; its length depends upon the height of the patient's bed.	d
1	glass adaptor; used to attach rubber intravenous tubing to plastic intravenous tubing.	e
1	container for collection of urine. In the drawings a plastic kitchen bucket with lid is shown; a hole is drilled in the lid to allow insertion of the plastic tubing.	f

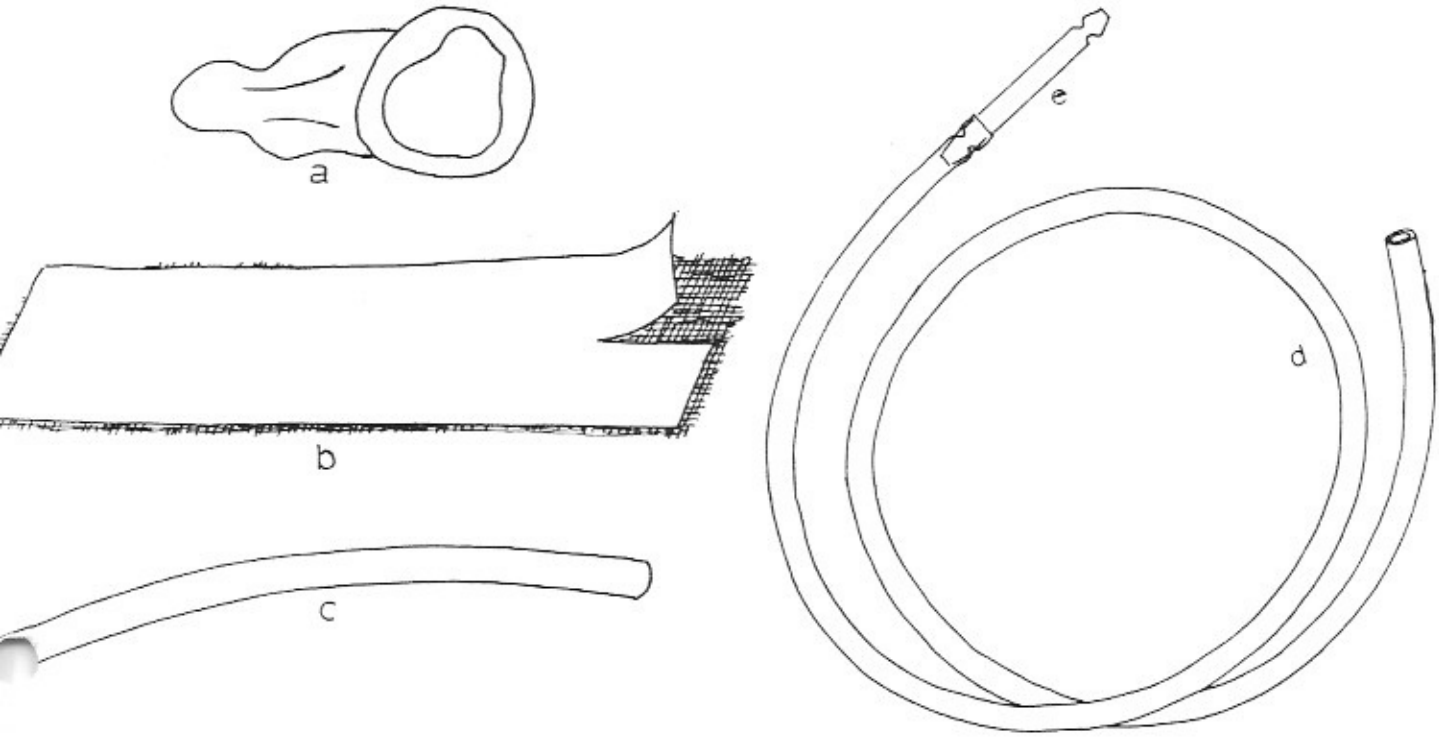


Fig. 6-5. Materials used to make a condom urine-drainage system.

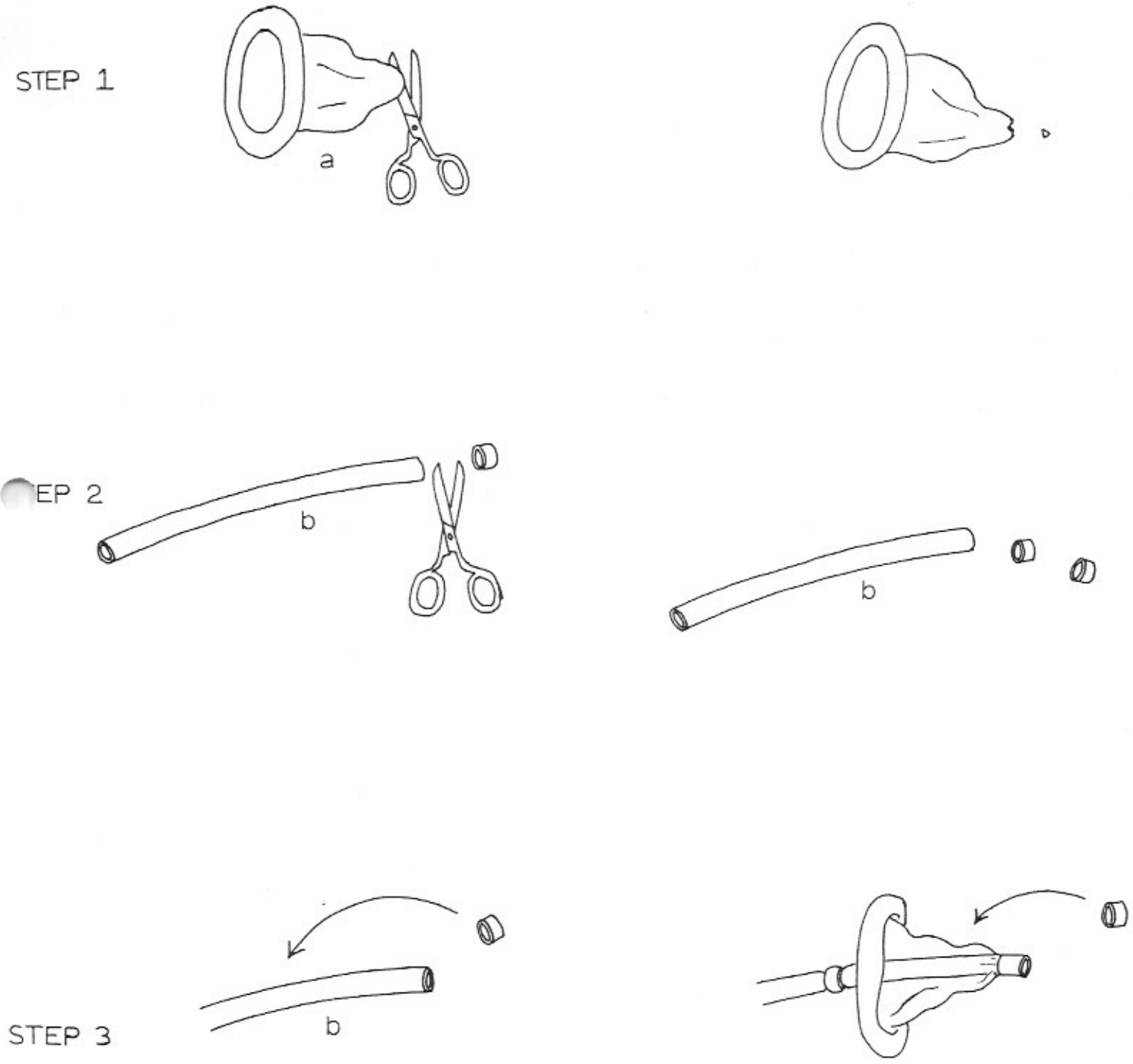
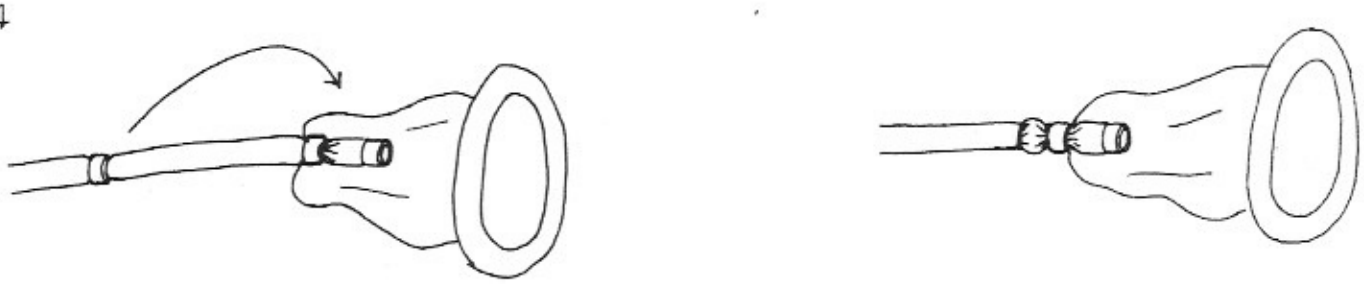
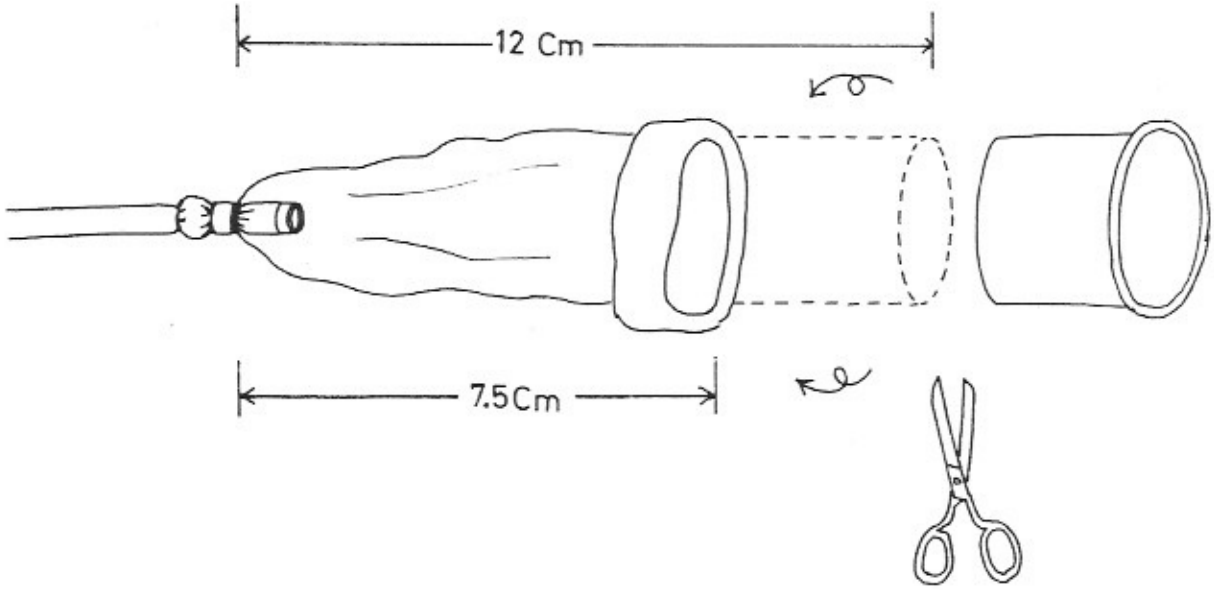


Fig. 6-6. Steps for construction of a condom urine-drainage system. *(Continued on next page).*

STEP 4



STEP 5



STEP 6

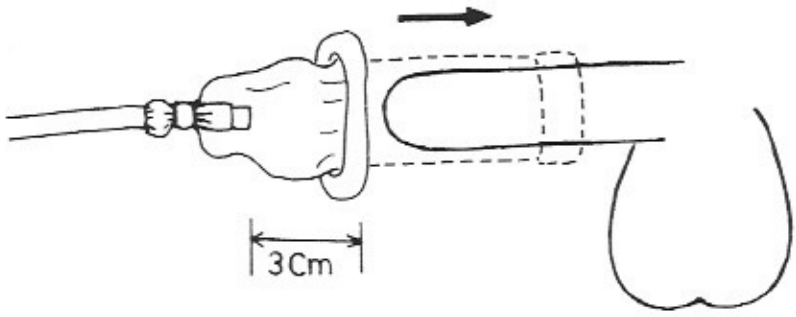
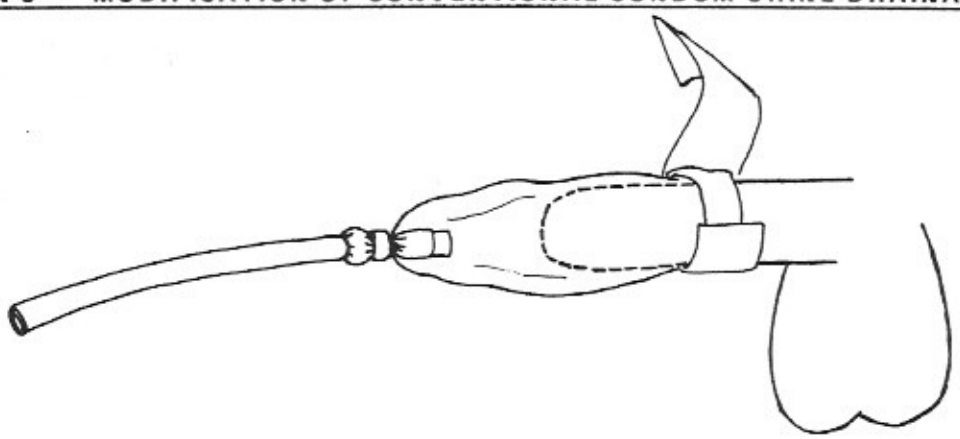
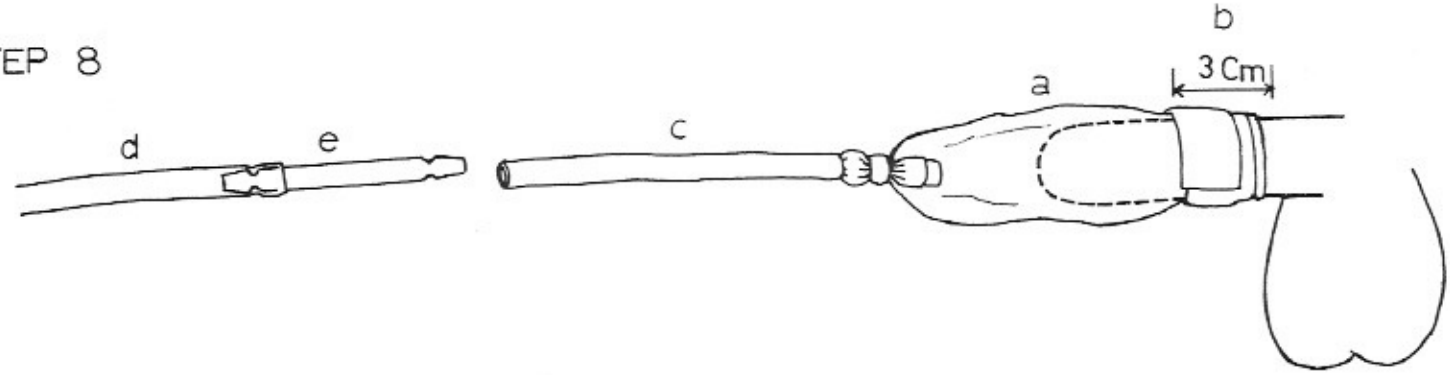


Fig. 6-6 (continued). Steps for construction of a condom urine-drainage system. (Continued on next page).

STEP 7



STEP 8



STEP 9

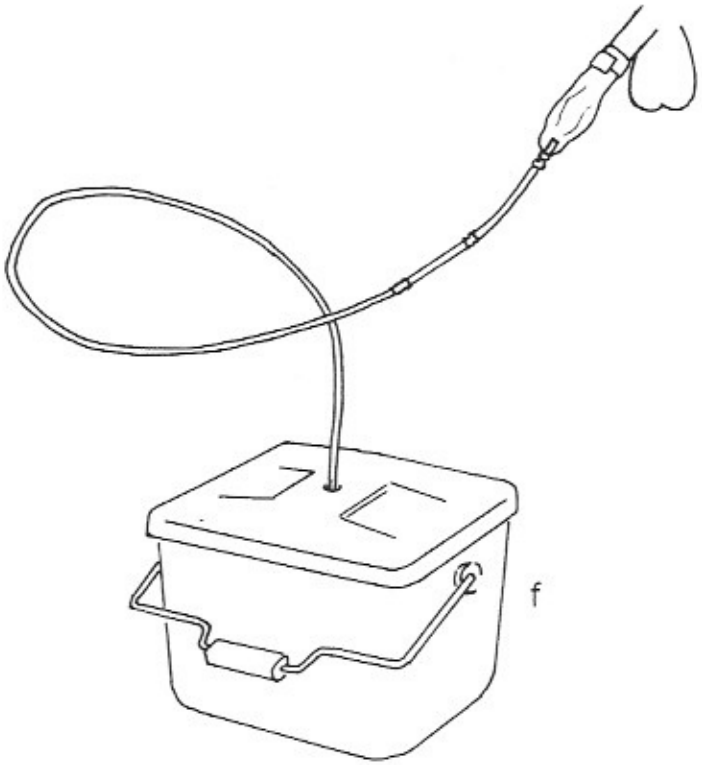


Fig. 6-6 (continued). Steps for construction of a condom urine-drainage system.

SECTION 7. TABLE

COLLAPSIBLE BED-TABLE OR FLOOR-TABLE

Description and Uses:

This table is a standard-type wheelchair lapboard (see standard lapboard, page 74), to which folding legs are attached, in order to make it useful for patients who must eat in bed or while sitting on the floor, as in a Japanese home (Fig. 7-2). It is light-weight and easily collapsed for storage.

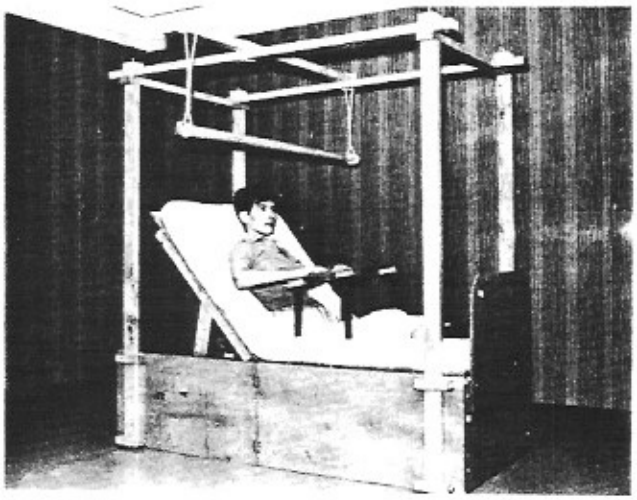


Fig. 7-1. Collapsible table used in bed.

Fig. 7-2. Collapsible table used on floor.

Details of Construction: (Figs. 7-3 through 7-5)

MATERIALS AND INSTRUCTIONS

5/8 in. (1.6 cm.) plywood, cut 26 x 23 in. (66 x 58.5 cm.) with half circle cut out of one edge 18 x 7 1/2 in. (45.7 x 19 cm.) for table top.	a
1 x 3 in. (2.5 x 7.6 cm.) lumber, cut into four pieces 3 1/2 x 3 1/2 in. (9 x 9 cm.) for securing legs to table top.	b
1 set of four folding table-legs, 12 in. (30.5 cm.) long	c

Wood glue Wood filler Wood stain
Screws Sandpaper Varnish
Paint brushes

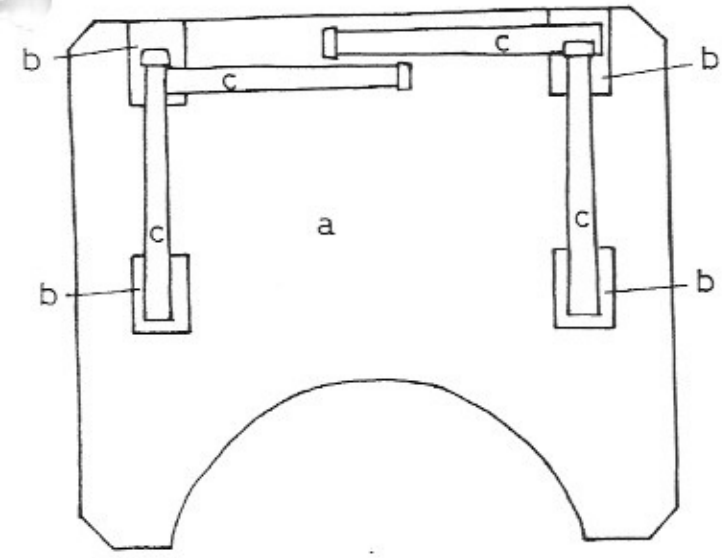


Fig. 7-4. Bottom view, showing legs folded.

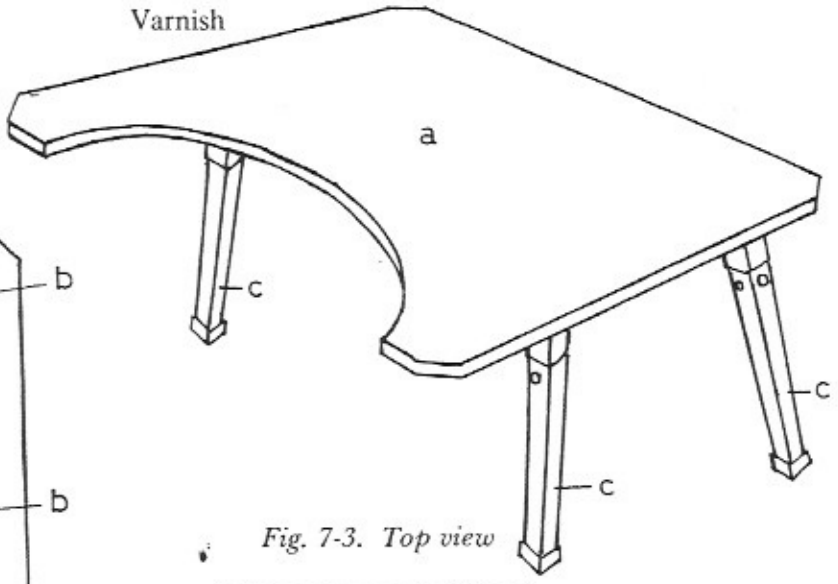


Fig. 7-3. Top view

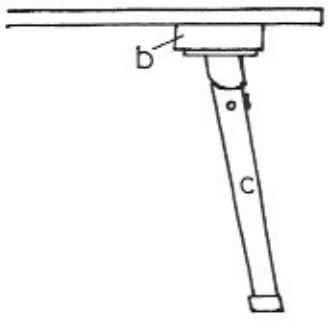


Fig. 7-5. Detail of leg-attachment.

Variation: Length of Legs.

The height of the table can be adjusted easily to the needs of an individual patient simply by sawing off the legs at desired length.

SECTION 8. COMMODE CHAIRS

WOODEN COMMODE CHAIR FOR JAPANESE STYLE TOILET WITH BACK ENTRANCE DOOR

Description and Uses:

This chair can be used for Japanese-style toilets which have an entrance door at the back of the toilet. The chair is placed over the Japanese-style toilet with the front of the chair facing the back of the commode. (Fig. 8-1.)

Fig. 8-1. Commode chair being placed over Japanese-style toilet. Door to commode room opens at back of toilet.

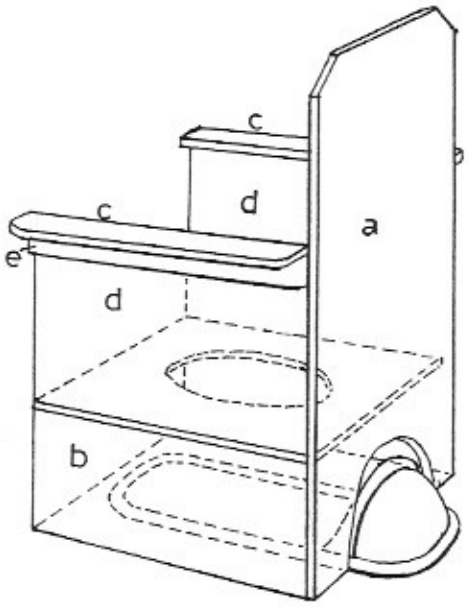


Fig. 8-2. Position of chair over Japanese-style toilet.

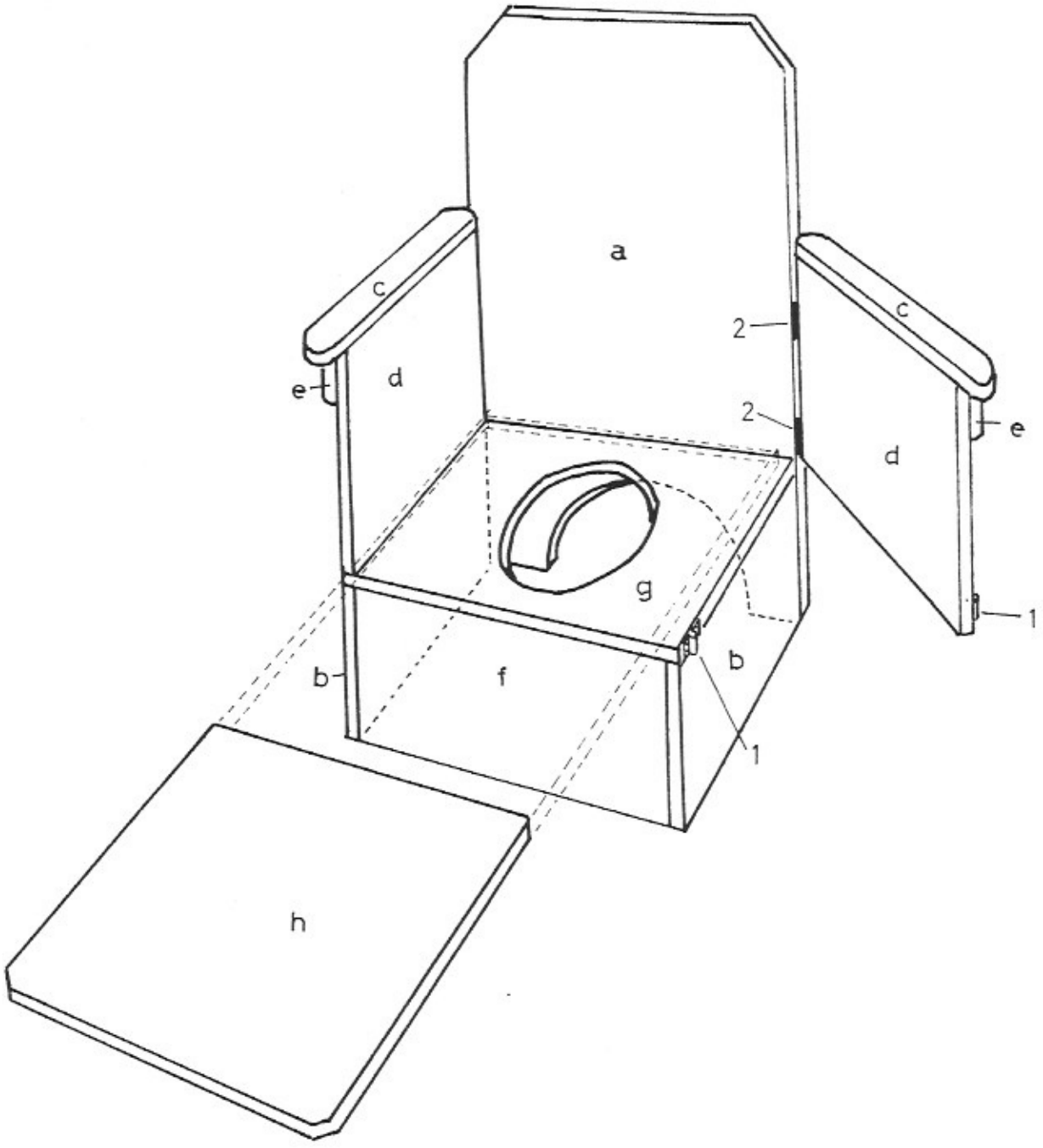


Fig. 8-3. Front view of commode chair, showing removable seat-board (used as a cover) and swinging removable arms.

Details of Construction: (Figs. 8-4 through 8-9)

MATERIALS AND INSTRUCTIONS

LUMBER

5/8 in. (1.6 cm.) Plywood

Cutting Plan

1	30 3/4 x 18 in. (78 x 45.7 cm.)	for back. Cut hole 10 5/8 x 7 in. (27 x 17.8 cm.)	a
2	17 3/8 x 7 in. (44.2 x 17.8 cm.)	for side bottoms.	b and b
1	16 3/4 x 7 in. (42.5 x 17.8 cm.)	for front.	f
1	17 1/2 x 18 in. (44.4 x 45.7 cm.)	for seat. Cut oblong hole 10 3/8 x 7 5/8 in. (26.4 x 19.3 cm.) Hole should be 3 in. from the back of chair.	g
2	17 3/8 x 10 1/4 in. (44.2 x 26 cm.)	for removable sides.	d and d
2	18 1/4 x 2 in. (46.3 x 5.1 cm.)	for arm rests. Round off corners.	c and c
2	17 3/8 x 1 1/4 in. (44.2 x 3.2 cm.)	brace for arm rests.	e and e
1	17 1/2 x 16 5/8 in. (44.4 x 42.2 cm.)	for seat cover.	h

HARDWARE

2 sliding latches to secure arms.

2 hinges. Cut and weld as shown in diagram in Fig. 8-9, page 58. Relocate the position of one screw-hole in the metal of each hinge. Paint outer parts of hinges to prevent rust.

Nails

Wood glue

FINISH

Sandpaper Paint brushes Varnish Wood filler Wood Stain

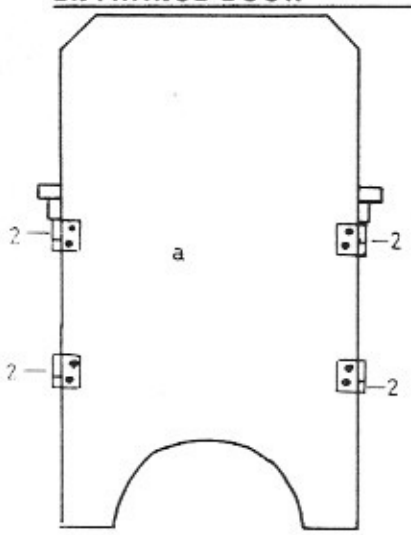


Fig. 8-4. Back view.

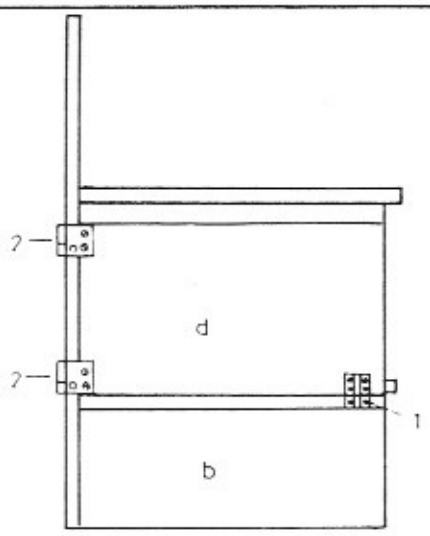


Fig. 8-5. Side view.

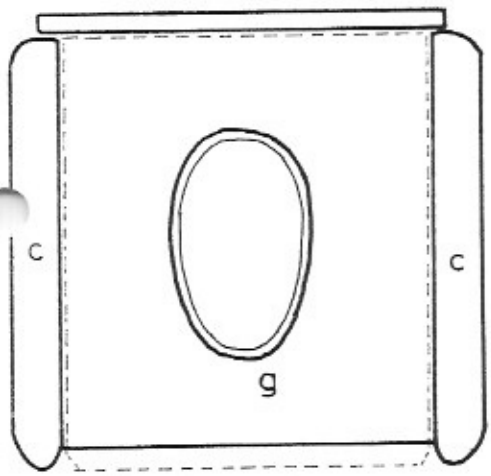
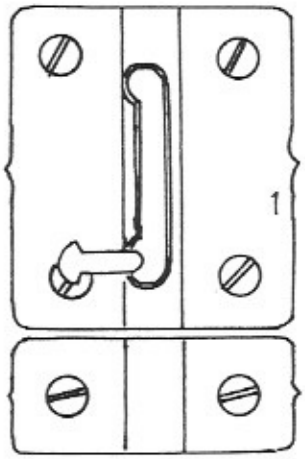


Fig. 8-6. Top view.



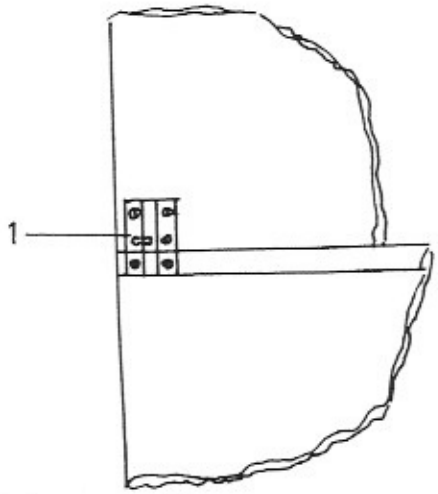


Fig. 8-7. Latch for removable arms.

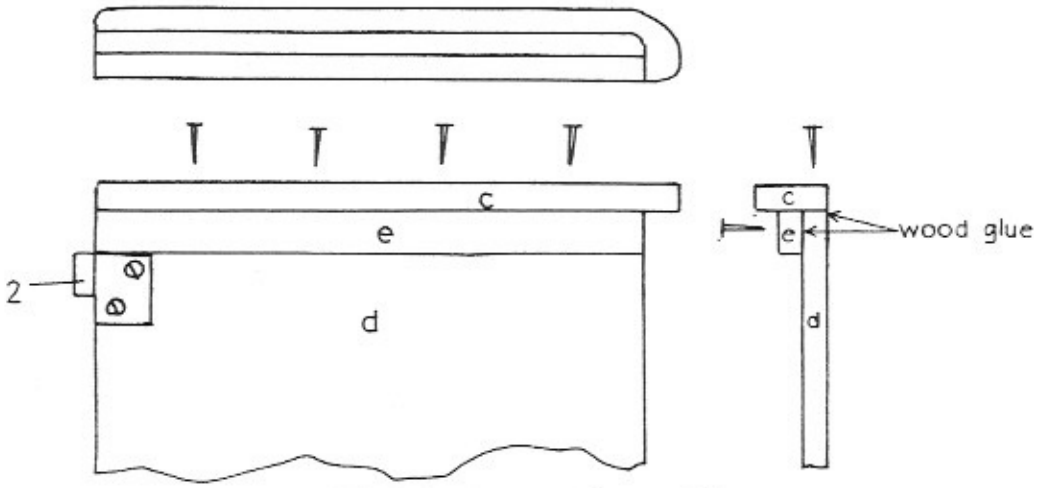


Fig. 8-8. Armrest of removable arm.

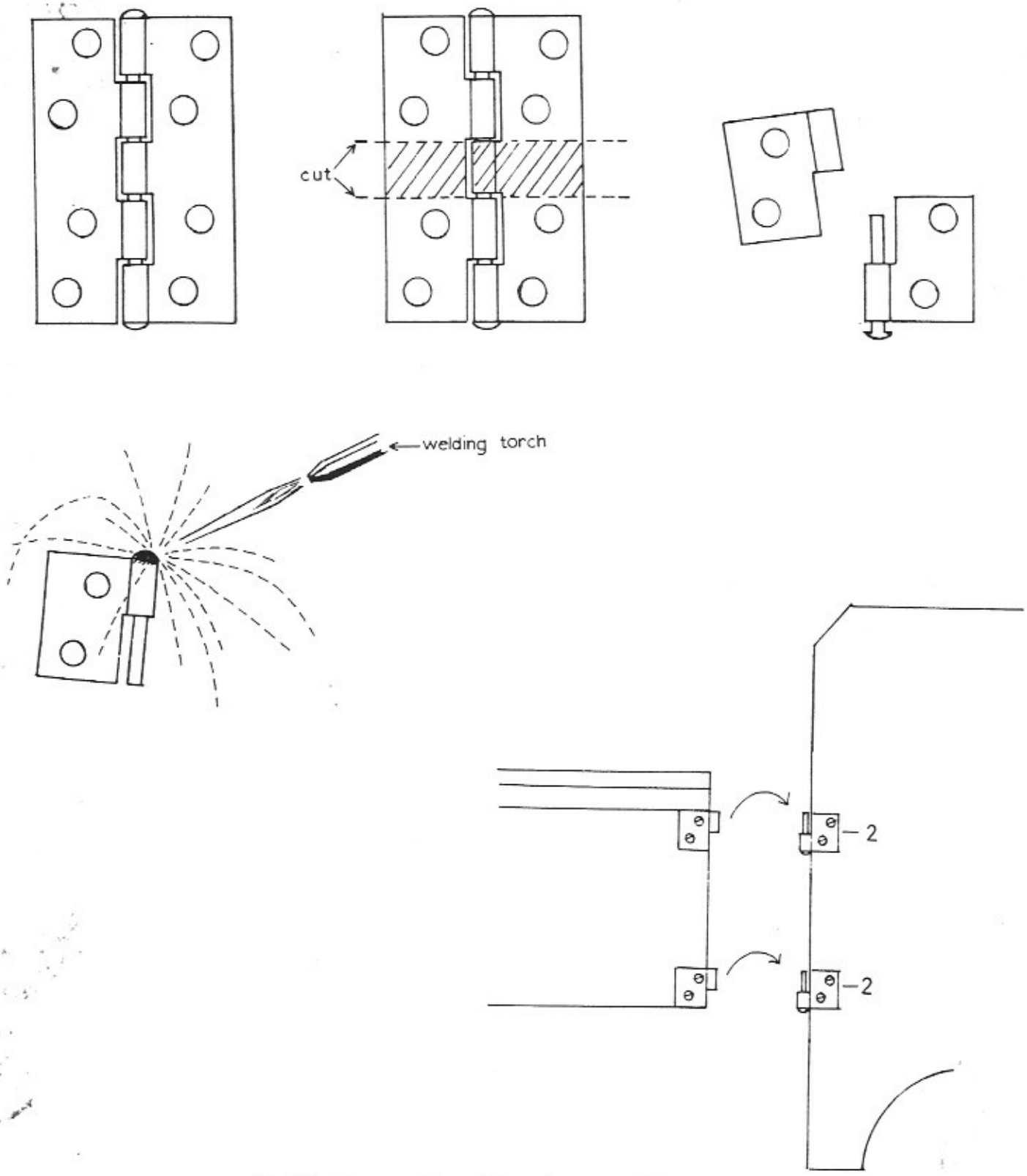


Fig. 8-9. Construction of hinge for removable arm.

PLEASE PASTE THIS COPY OVER PAGE 58

Variations:

Variation A. Wooden Commode Chair for Japanese-Style Toilet with Side Entrance Door (Fig. 8-10 through 8-13.)

This chair is to be used for toilet rooms entered through a side door. The chair is so placed that the patient is facing in the usual direction for use of a Japanese toilet. (Fig. 8-10.)

For this variant, all construction is the same as for the chair described on page 56, except that the depth of the chair must be greater, the bottom back of the chair is shaped differently, and the dimensions of the seat cover must be increased.

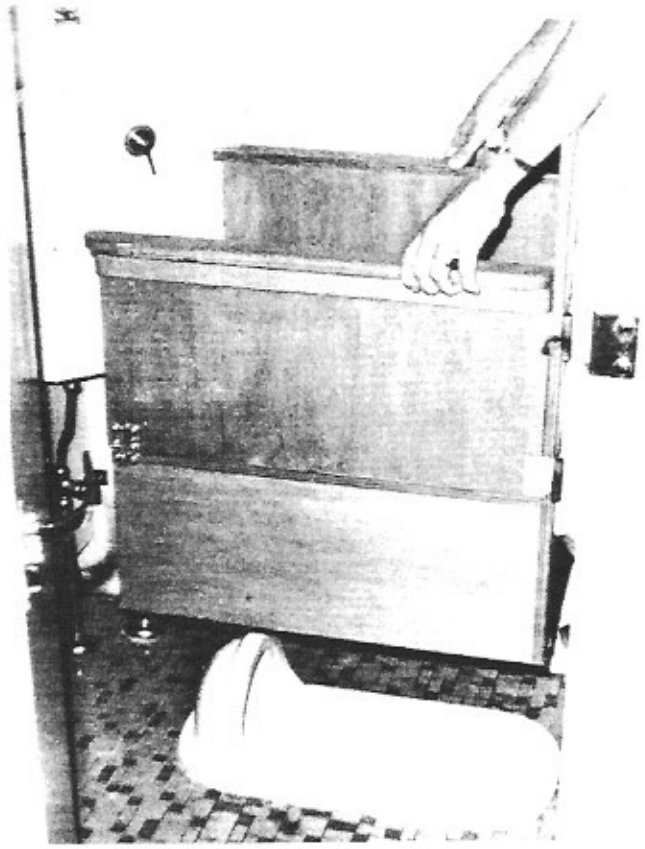


Fig. 8-10. Commode chair being placed over Japanese-style toilet. In this case, the door to the toilet area is at the side of the room.

VARIATIONS FROM MATERIALS LIST GIVEN ON PAGE 56

LUMBER

5/8 in. (1.6 cm.) Plywood

Cutting Plan

1	30 3/4 x 18 in. (78 x 45.7 cm.)	for back. Cut hole 10 1/4 x 1 1/2 in. (26 x 4 cm.)	a
2	21 3/8 x 7 in. (54.3 x 17.8 cm.)	for side bottoms.	b and b
1	16 3/4 x 7 in. (42.5 x 17.8 cm.)	for front.	f
1	21 1/2 x 18 in. (54.5 x 45.7 cm.)	for seat. Cut oblong hole 10 3/8 x 7 5/8 in. (26.4 x 19.3 cm.) Hole should be 3 in. from back of chair.	g
2	22 1/4 x 2 in. (56.5 x 5.1 cm.)	for arm rests. Round off corners.	c and c
2	21 3/8 x 10 1/4 in. (54.3 x 26 cm.)	for removable sides.	d and d
2	21 3/8 x 1 1/4 in. (54.3 x 3.2 cm.)	brace for arm rests.	e and e
1	21 3/8 x 16 5/8 in. (54.3 x 42.2 cm.)	for seat cover.	h

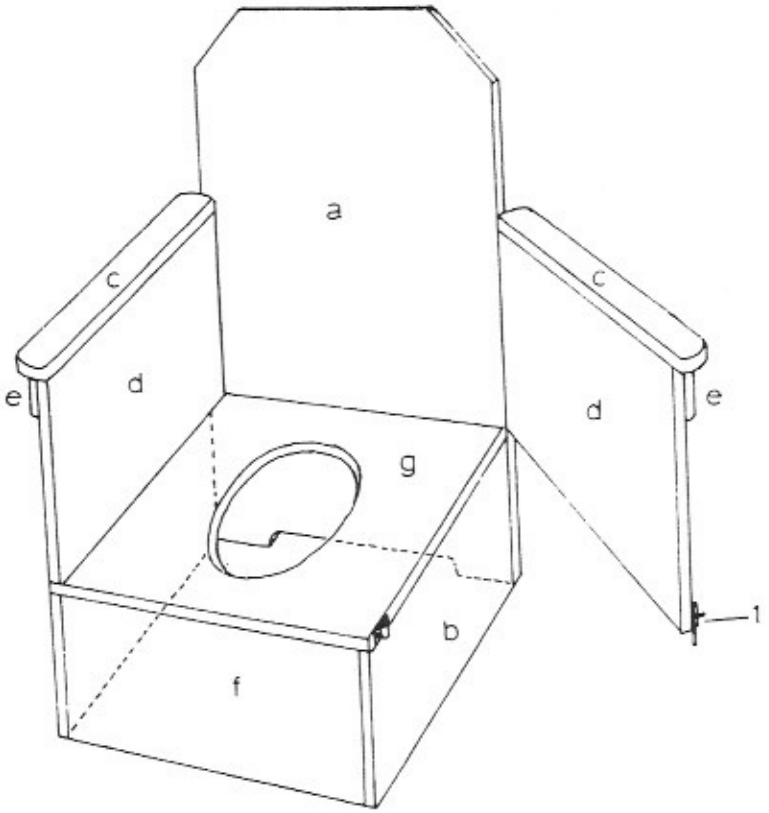


Fig. 8-11. Front view.

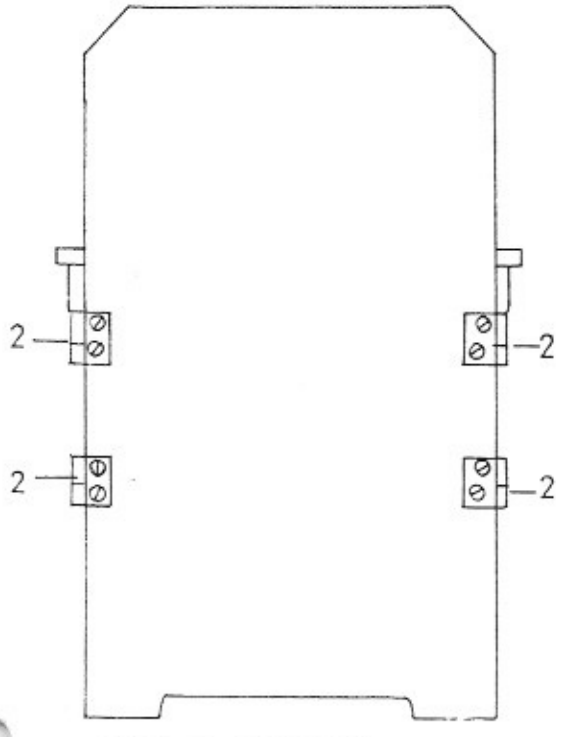


Fig. 8-12. Back view.

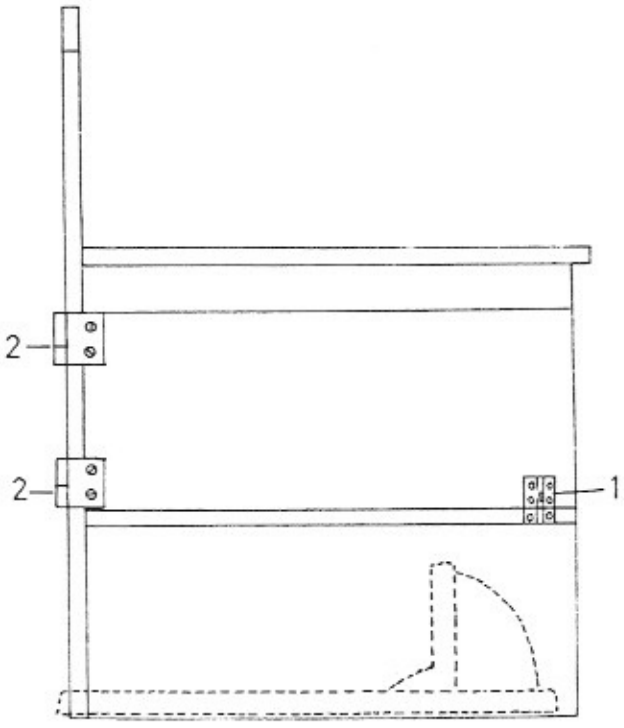


Fig. 8-13. Side view showing position over Japanese-style toilet.

Variation B. Floor Chair (Figs. 8-14 through 8-21)

To serve as a commode chair for a home which has no inside toilet, the chair described beginning on page 54 can be used with no alterations except for the shape of the bottom back to allow insertion of a container for collecting urine and feces (Fig. 8-20 and 8-21). The resultant multipurpose chair can be used for sitting; for a commode; and, with a lapboard, for eating, reading, writing, etc. (Figs. 8-14 and 8-17). The lapboard, by giving more stability, can aid severely handicapped patients to sit. A cushion for the back and/or seat may be used.

Because the chair is low, it is easy for a patient to move unassisted from floor to chair (Fig. 8-18). If a patient is too severely handicapped to transfer unassisted, his relatives can easily help him to transfer from the floor to the chair. (Fig. 8-19.)

Fig. 8-14. Oblique view.

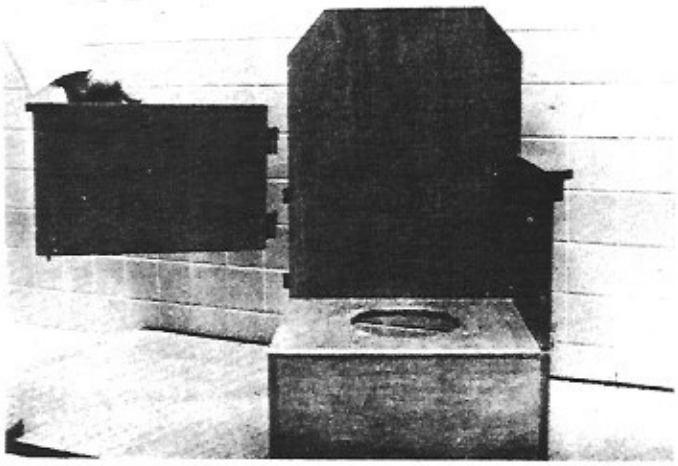


Fig. 8-15. Oblique view.

Fig. 8-16. Front view of floor chair.

Fig. 8-17. Patient using a floor chair.

Fig. 8-18. Patient transferring to chair unassisted.

Fig. 8-19. Patient transferring to chair with minimal assistance.

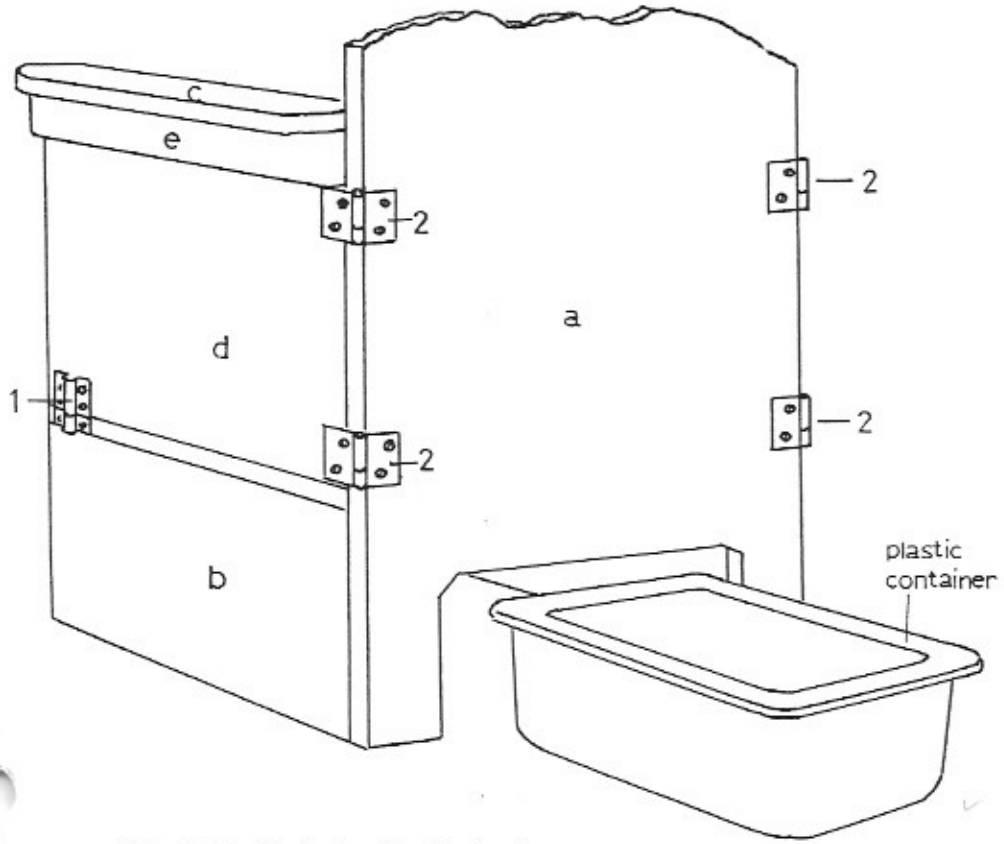


Fig. 8-20. Variation B. Back view.

Fig. 8-21. Commode chair used with a plastic container.

Variation C. Commode Chair for Children or Patients with Cerebral Palsy

The chair described beginning on page 54 works well for patients suffering from cerebral palsy if dimensions are changed to child-size. The chair can be used by the child as a commode chair, a commode chair over a toilet, or as a chair for sitting, eating, writing, etc. A cushion for the back and/or the seat may be added.

A patient may have better head-control if the back of the chair is made higher.

BEDSIDE COMMODE WITH REMOVABLE ARMS

Description and Uses:

A bedpan fits snugly beneath the seat of this chair (Figs. 8-27 through 8-30). The chair can be made to any height. For most patients, a chair of regular height is adequate or best (Fig. 8-30).

For some patients, transfers from bed to bedside commode are facilitated if the chair is the same height as a hospital bed (Figs. 8-27 through 8-31). When a tall bedside commode is used, a high, large, stable footstool should be used with it (Figs. 8-27 through 8-30).

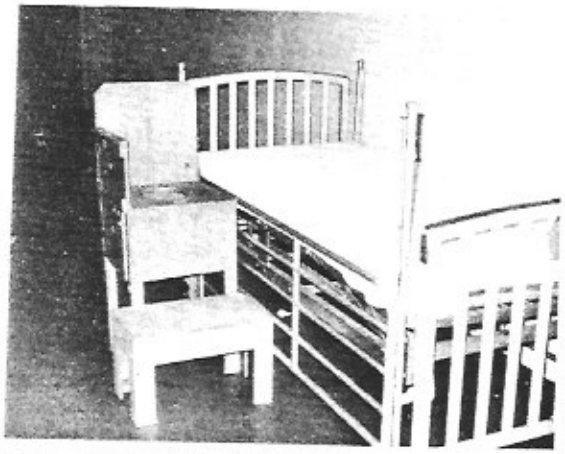


Fig. 8-27. Front view, showing one arm removed.

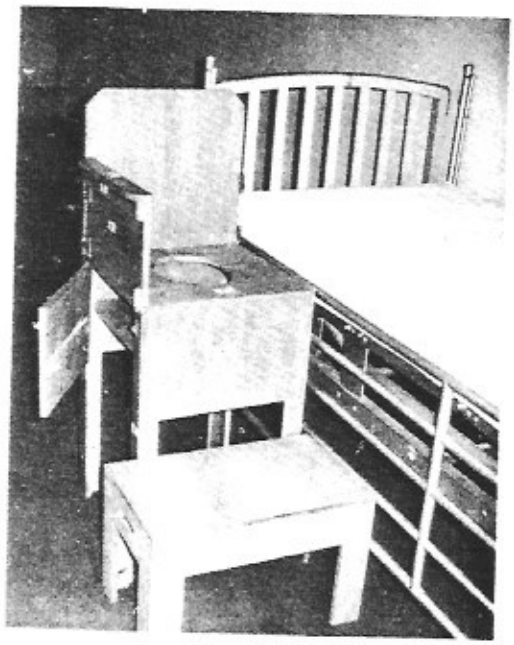


Fig. 8-28. With bedpan-shelf displayed.

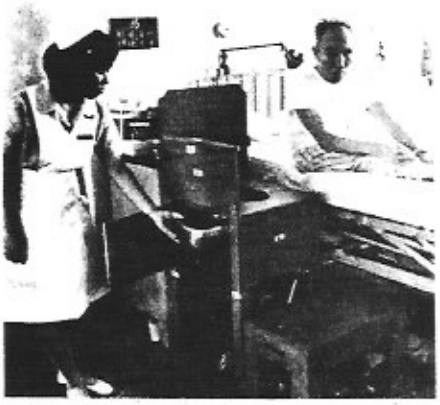


Fig. 8-29. Nurse removing bedpan.

Fig. 8-30. Patient transferring to bedside commode unassisted.

Fig. 8-31. Patient transferring with the assistance of a nurse.

Details of Construction: (Figs. 8-32 through 8-37)

MATERIALS AND INSTRUCTIONS FOR A COMMODE CHAIR THE HEIGHT OF A REGULAR HOSPITAL BED

LUMBER

5/8 in. (1.6 cm.) Plywood

Cutting Plan

1	47 x 18 in. (119.4 x 45.7 cm.)	for back. Cut out 20 3/4 x 14 in. (52.7 x 35.5 cm.) for legs and round off top corners.	a
4	29 x 1 3/4 in. (73.7 x 4.5 cm.)	for legs on sides.	b
2	14 1/4 x 7 3/4 in. (36.2 x 19.7 cm.)	for doors.	c
1	29 x 16 7/8 in. (73.7 x 42.8 cm.)	for front. Cut out 20 3/4 x 14 in. (52.7 x 35.5 cm.) for legs.	e
2	17 1/2 x 9 7/8 in. (44.5 x 25.1 cm.)	for removable arms.	f
2	18 1/4 x 2 in. (46.4 x 5 cm.)	for arm rests. Round off ends.	g
2	17 1/2 x 2 in. (44.5 x 5 cm.)	for arm rest supports.	h
1	18 x 17 1/2 in. (45.7 x 44.5 cm.)	for seat. Hole cut 10 5/8 x 7 in. (27 x 17.8 cm.) oblong and bevel edge.	i
1	17 x 16 7/8 in. (43 x 42.8 cm.)	for bed pan shelf.	j
1	10 3/4 x 5 1/2 in. (27.4 x 14 cm.)	glue to k_1 and attach to shelf for bedpan holder.	k
1	10 3/4 x 4 1/2 in. (27.4 x 11.2 cm.)	(See k above.)	k_1
1	18 x 16 5/8 in. (45.7 x 42.2 cm.)	for seat lid.	l
2	5/8 x 5/8 x 45 3/4 in. (1.5 x 1.5 x 116.1 cm.)	for additional stabilization of back.	m

HARDWARE

2 large hinges cut and used as described on page 58.

4 2 in. (10 cm.) door hinges.

4 sliding latches used as described on page 57.

Nails
Wood glue

FINISH Sandpaper Paint brushes Varnish Wood filler Wood stain

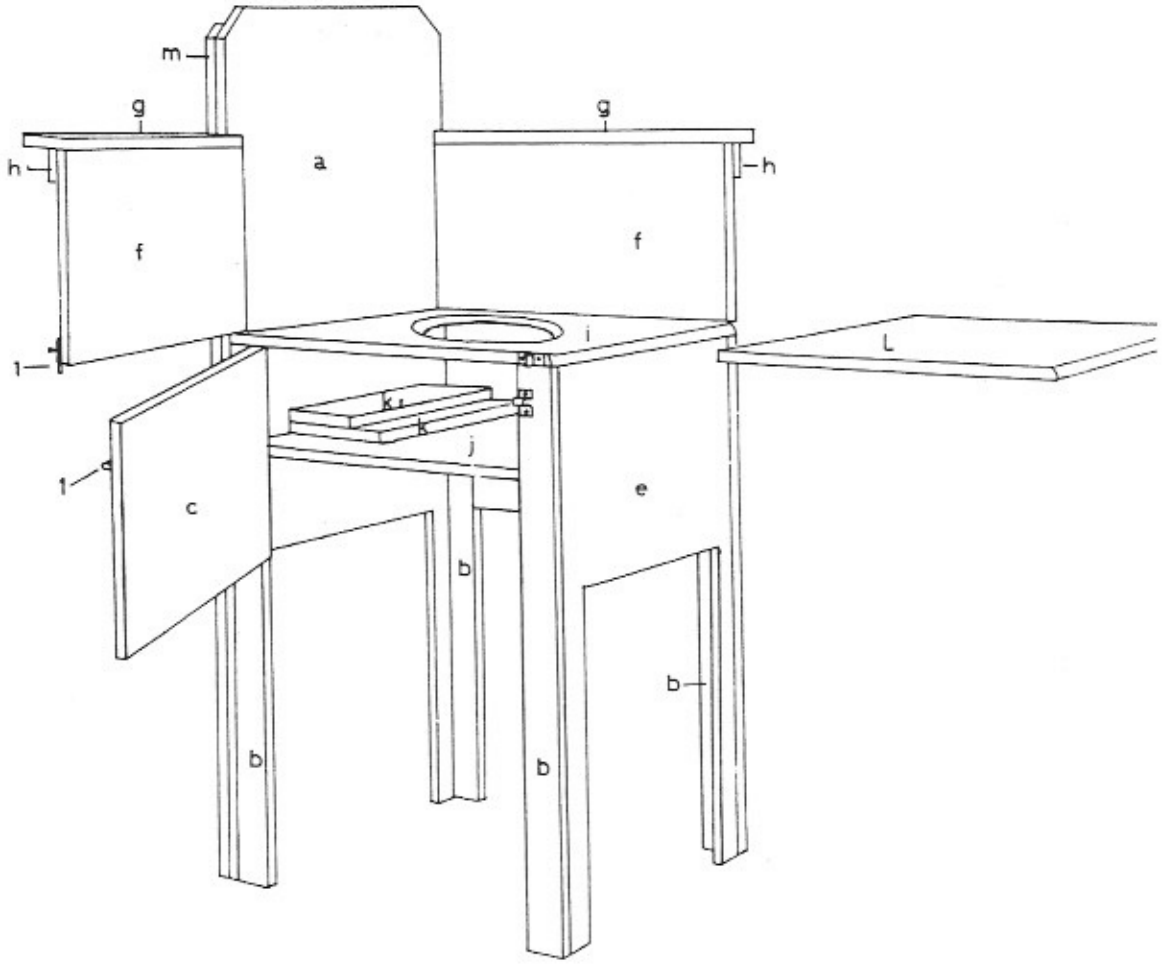


Fig. 8-32. SIDEVIEW.

MATERIALS AND INSTRUCTIONS FOR STOOL

LUMBER

5/8 in. (1.6 cm.) Plywood

Cutting Plan

2	22 x 13 1/2 in. (56 x 34.3 cm.)	for front and back. To make legs cut out a piece 16 x 9 1/2 in. (40.6 x 24.1 cm.).	a
2	12 1/4 x 13 1/2 in. (31.1 x 34.3 cm.)	for ends. To make legs, cut out a piece 7 x 9 1/2 in. (17.8 x 24.1 cm.). Cut out of each end piece 4 x 1 in. (10 x 2.5 cm.) for hand hold.	b
1	22 x 13 in. (55.8 x 33 cm.)	for top.	c
4	13 3/4 x 2 in. (33.7 x 5 cm.)	for additional leg supports.	d

MISCELLANEOUS

Wood glue	Wood stain	Nails	Paint brush
Varnish	Sandpaper	Wood filler	

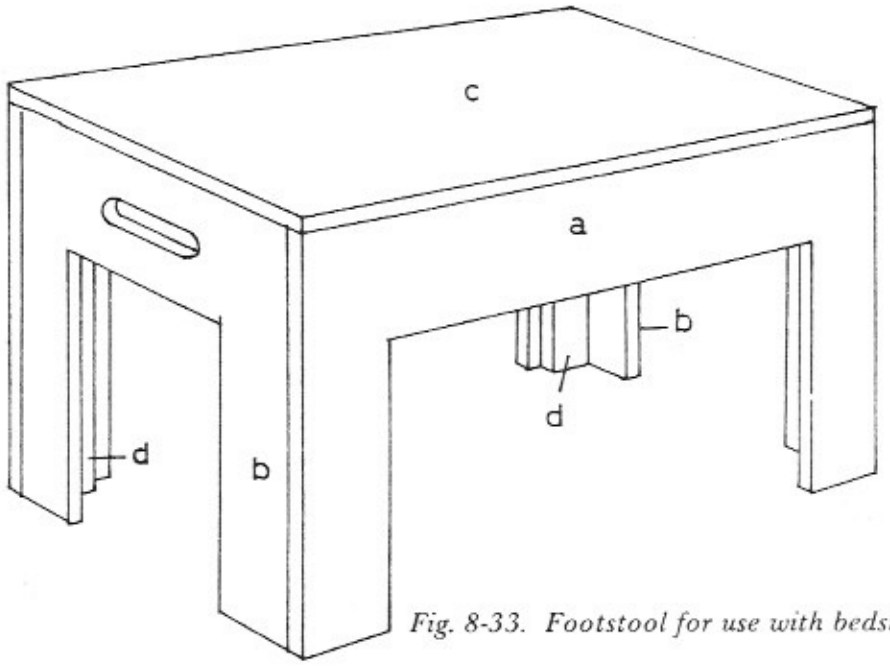


Fig. 8-33. Footstool for use with bedside commode.

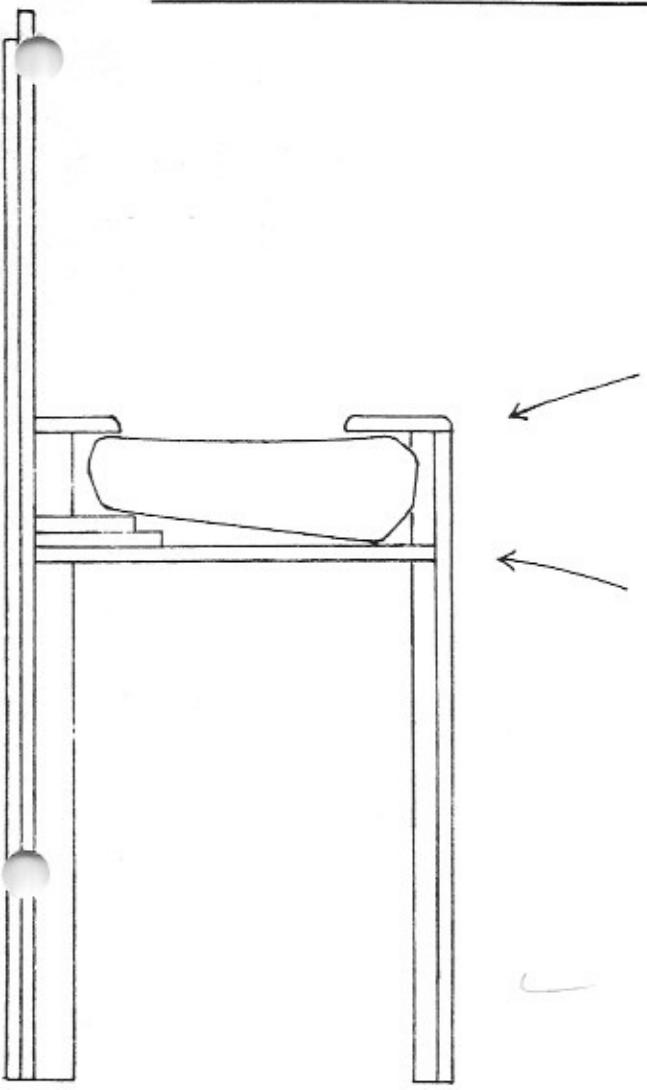


Fig. 8-34. Cut-away sideview, showing bedpan in place.

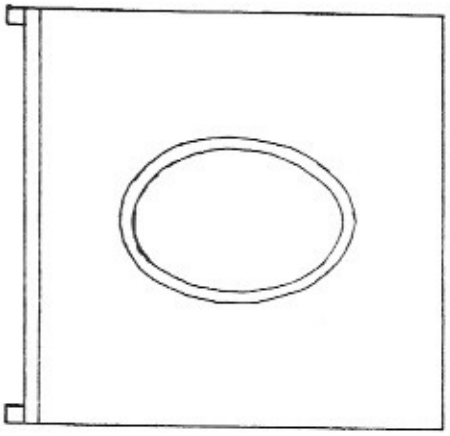


Fig. 8-35. Top view of chair.

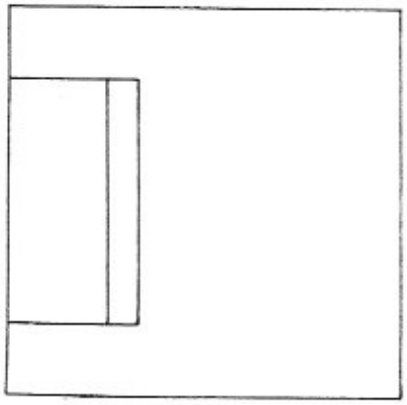


Fig. 8-36. View of bedpan shelf.

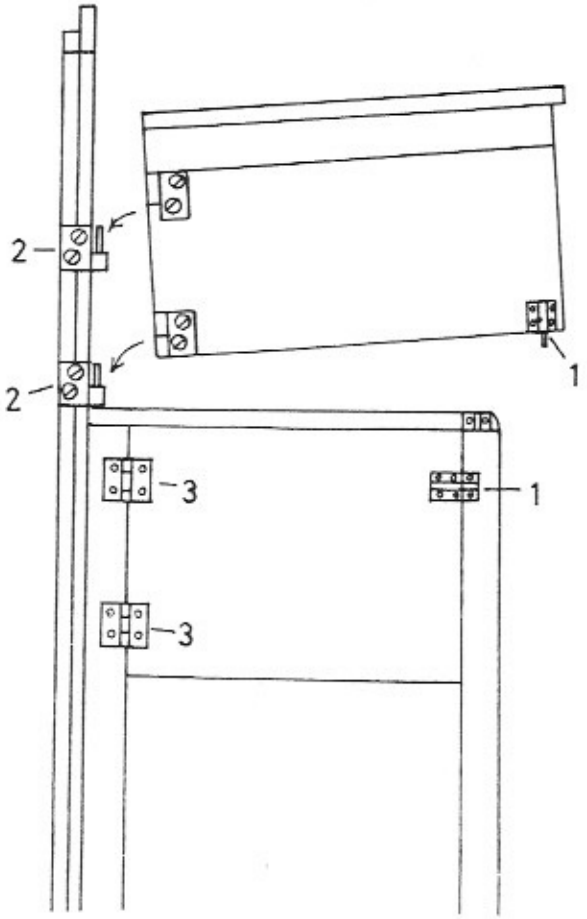


Fig. 8-37. Side view showing removable arm. Also this view shows chair height made the same as a regular chair (approximately 17 in. from top of seat to floor).

Variations:

Variation A. Bedside Commode used with Plastic Container Instead of Bedpan (Fig. 8-38).

The size and shape of the shelf can be altered to fit any inexpensive container for collection of urine and feces.

All construction is the same as for the chair described on page 67, except that the shelf-depth is altered to fit the available plastic container and the pieces of lumber K_1 and K_2 (Figs. 8-35 and 8-38) are not needed.

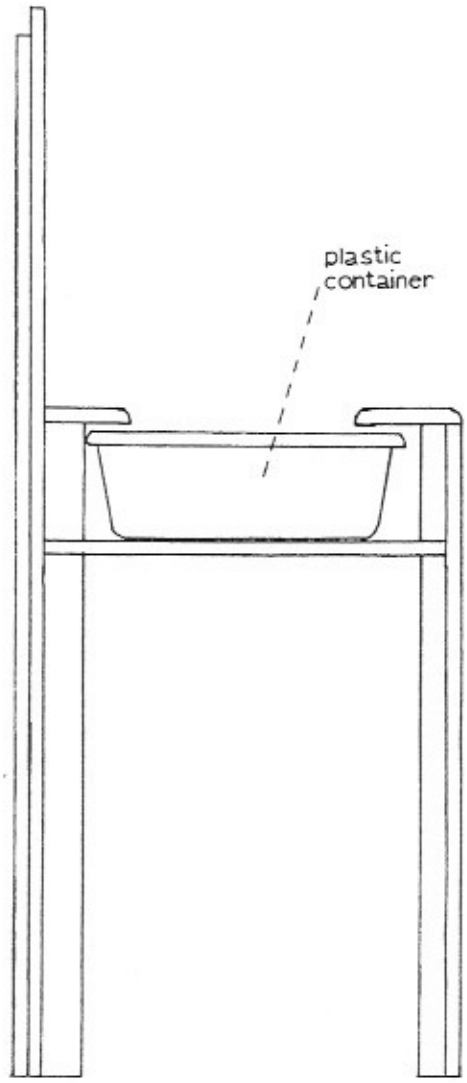


Fig. 8-38. Side view cut-away.

Variation B. Commode Chair for Bed of Wheelchair-height. (Fig. 8-39.)

To make this chair for use with the bed described in Section 5, the height of the legs should be changed. The distance from the top of the commode seat to the floor should be 19 7/8 in. (50 cm.)

The footstool used with a commode chair of this height should be approximately 3 3/4 in. (9.5 cm.) tall. The width and depth should be the same as that of the footstool described on page 69.

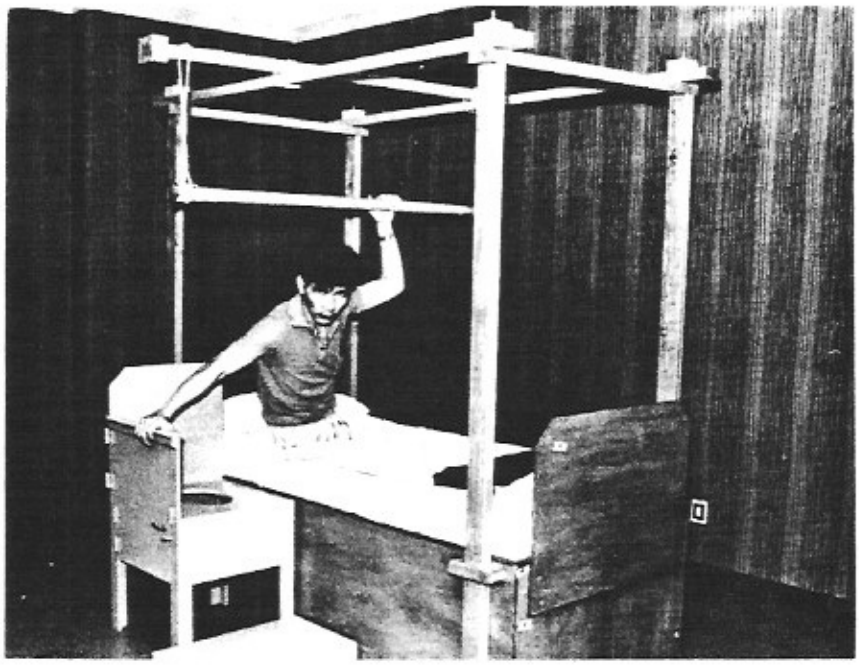


Fig. 8-39. Paraplegic patient transferring to commode from wheelchair-height bed.

A COMMERCIAL WOODEN CHAIR ADAPTED TO A BEDSIDE COMMODE

Description and Uses:

Many types of commercial wooden chairs can be adapted for use with a bedpan as a bedside commode. The illustrations show how one type of wooden desk-chair was altered to make a bedside commode (Figs. 8-40 and 8-41).

Fig. 8-40. Front view, with seat-cover removed.

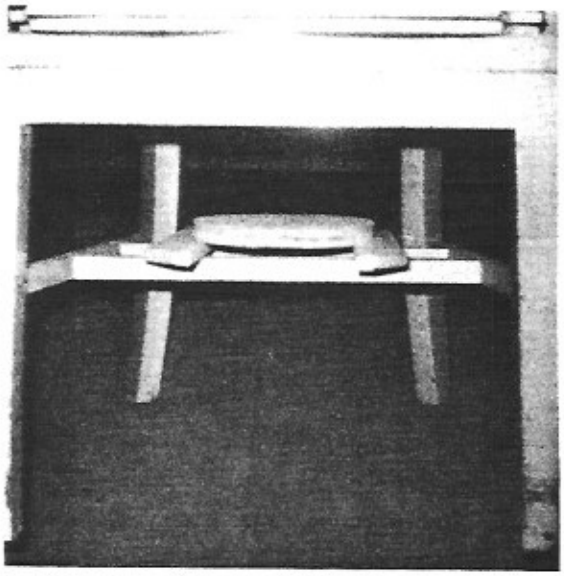


Fig. 8-41. Front view, showing bedpan shelf beneath the chair.

SECTION 9. LAPBOARD

CONVENTIONAL LAPBOARD* FOR WHEELCHAIR OR FLOOR CHAIR

Description and Uses:

This standard lapboard for use with a wheelchair is easily constructed and adapts readily to use with the floor chair described on page 62 and with the different kinds of commode chairs, if desired.

A lapboard affords additional stability for some types of patients.

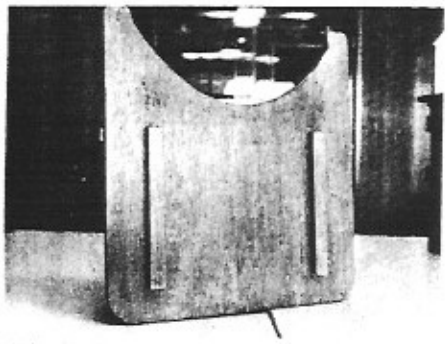


Fig. 9-1. Bottom View

Fig. 9-2. Lapboard being placed on a wheelchair.

Details of Construction: (Figs 9-3 through 9-5).

MATERIALS AND INSTRUCTIONS

LUMBER

5/8 in. (1.6 cm.) Plywood

Cutting Plan

1	22 x 23 in. (56 x 58.4 cm.)	Round off corners. Cut out curve 18 in. long x 7 in. deep (45 cm. long x 17.7 cm. deep).	a
2	12 x 1 1/4 in. (30.5 x 3.1 cm.)	for stabilization at arms of wheelchair.	b_1 and b_2

MISCELLANEOUS

Nails Wood glue Sandpaper Wood filler Wood stain Paint brushes Varnish

* One version of a conventional wheelchair lapboard is described in the following reference: Truog, N.: Adjustable Lapboard. American Journal of Occupational Therapy 28: 67, 1964.

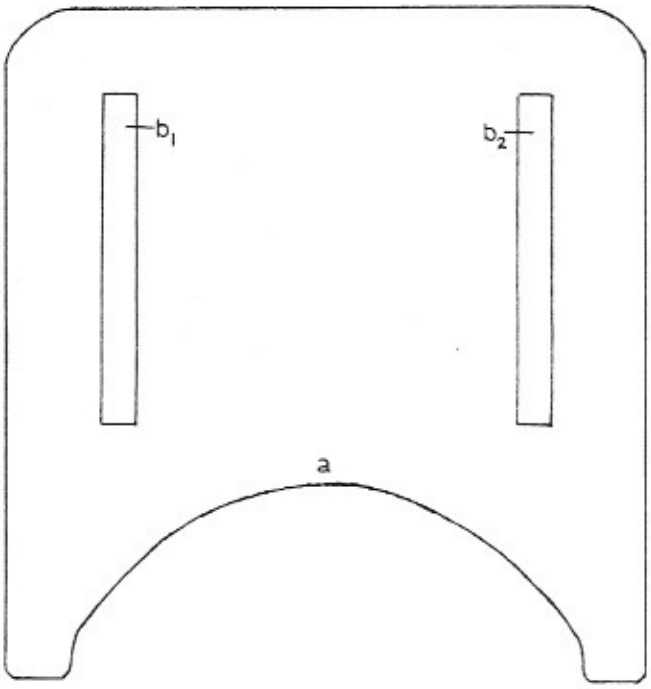


Fig. 9-3. Bottom view

Fig. 9-4. Side view

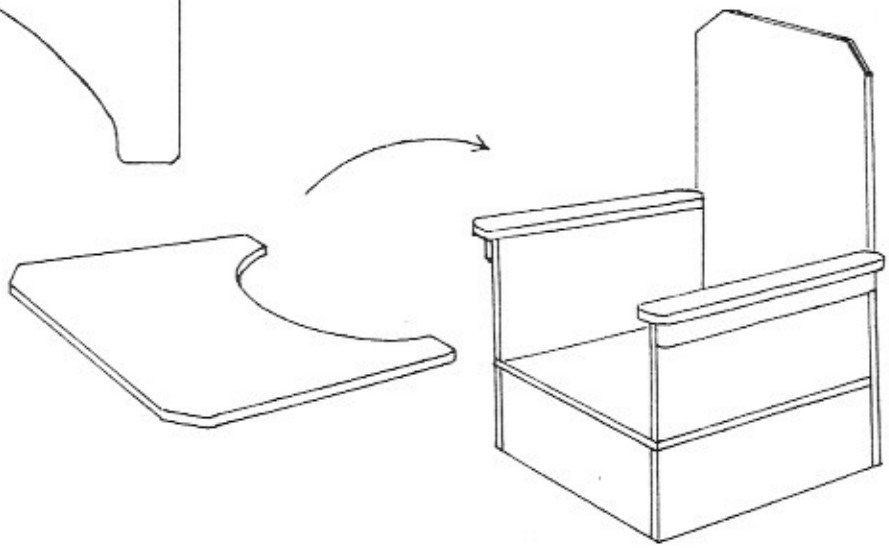


Fig. 9-5. Commode chair with lapboard.

Variations:

Variation A. Width

The width of the board can be varied to fit different size wheelchairs, tatami chair arms and commode chairs.

Variation B. Size of Curve

The size of the curve cut out should be varied to fit the individual patient.

Variation C. Width of Support-Pieces

The support-pieces under the lapboard must be adjusted to fit snugly inside the arms of the individual chair, in order to assure stability during use of the lapboard.

SECTION 10. BATHROOM CHAIRS

LOW ROLLING CHAIR

Description and Uses:

This low rolling chair (Figs. 10-1 and 10-2) is easily constructed from plywood and adapts readily to use in the Oriental home either on wood or tatami floors. It is especially practicable in the Oriental-style bathing room.

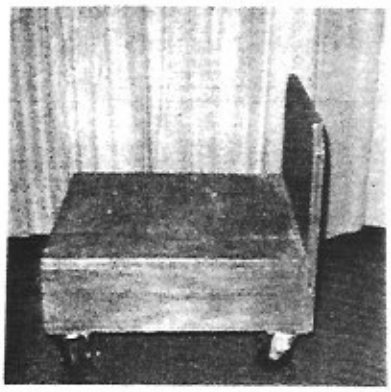


Fig. 10-1. Side view.

Fig. 10-2. Front view.

Details of Construction: (Figs. 10-3)

MATERIALS AND INSTRUCTIONS

LUMBER

1/2 in. (1.3 cm.) Plywood

Cutting Plan

1	13 x 15 3/4 in. (33 x 40 cm.)	for back. Round off top corners.	a
2	15 x 15 3/4 in. (38 x 40 cm.)	for seat and bottom.	b and c
2	15 x 3 1/2 in. (38 x 9 cm.)	for sides of seat.	d and e
1	14 1/2 x 3 1/2 in. (37 x 9 cm.)	for front of seat.	f

HARDWARE

4	ball-bearing casters, 2 1/2 in. (6.5 cm.) diameter, with screws	g, h, i, j

Nails Wood glue

FINISH Sandpaper Paint brushes Varnish Wood filler Wood stain

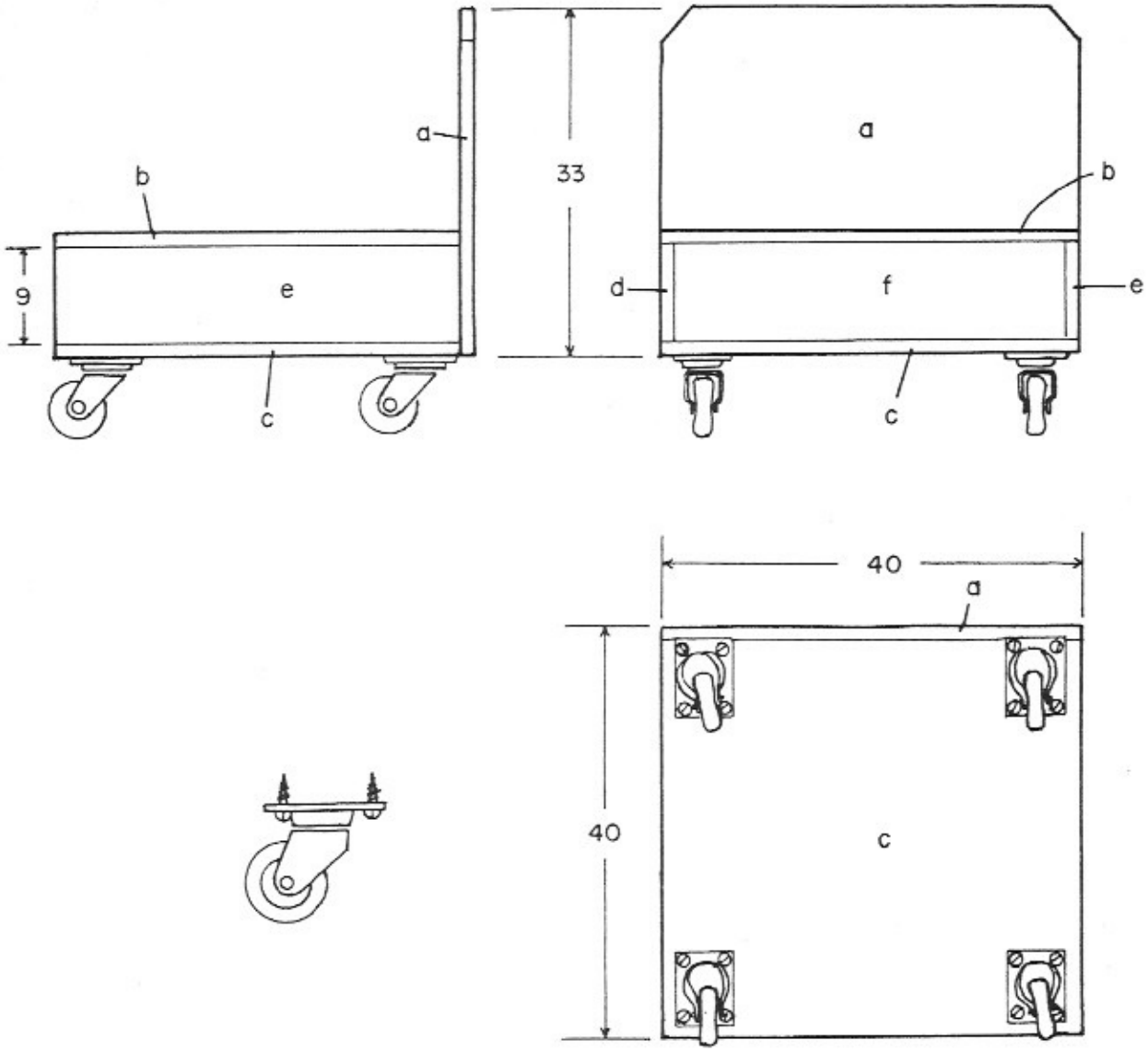


Fig. 10-3. Construction-diagrams.

Variations: Seat-size and back-height

The size of the seat and the height of the back of the chair may be modified to fit the needs of stability and the size of the individual patient.

COMMERCIAL DESK CHAIR USED AS A BATHROOM CHAIR

Description and Uses:

Many types of small chairs on wheels can be used to transfer handicapped patients from bed to toilet, bathtub, etc., when the entrance door and/or area of the bathroom is too small for admission of regular wheelchairs or litters. One type is shown below. This type of commercial desk chair (Figs. 10-4 and 10-5) is often present in offices of a hospital.

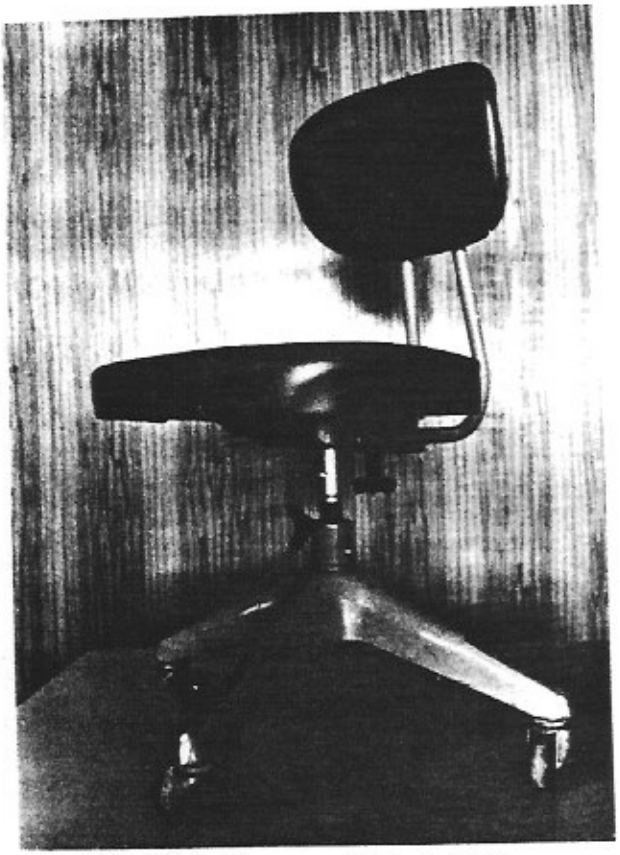


Fig. 10-4. Commercial desk chair.

Fig. 10-5. Commercial desk chair used to transport a patient.

COMMERCIAL WOODEN CHAIR MADE INTO BATHROOM CHAIR

Description and Uses:

Many types of narrow, small, wooden commercial chairs are easily converted to a bathroom chair for physically-handicapped patients. These chairs can be used in bathrooms where the door and/or floor space are too small for a standard wheelchair.

Methods of converting one kind of commercial chair to a bathroom chair are described below (Figs. 10-6 through 10-9). The foot-rest ("b") has an anti-tip stop ("i"), to provide safety for the patient.

Details of Construction: (Figs. 10-6 through 10-9)

MATERIALS AND INSTRUCTIONS

1 small size wooden chair. Cut off legs to measure 14 in. (36 cm.) from top of seat.	a
1/2 in. (1.3 cm.) plywood cut to fit bottom of chair plus 7 1/2 in (9 cm.) extension for foot rest.	b
2 1/2 x 1 1/4 in. (6.3 x 3.2 cm.) wood cut 4 in. (10.2 cm.) for support-block at front of chair.	i
Plywood to attach footrest to front and back rungs of chair.	j
4 ball-bearing swivel wheels, diameter 2 1/2 in. (6.3 cm.)	c
Sponge-rubber for seat-padding	d
Heavy duty plastic to cover sponge	

Upholstery tacks	Nails	Screws
Wood glue	Paint	Paint brush

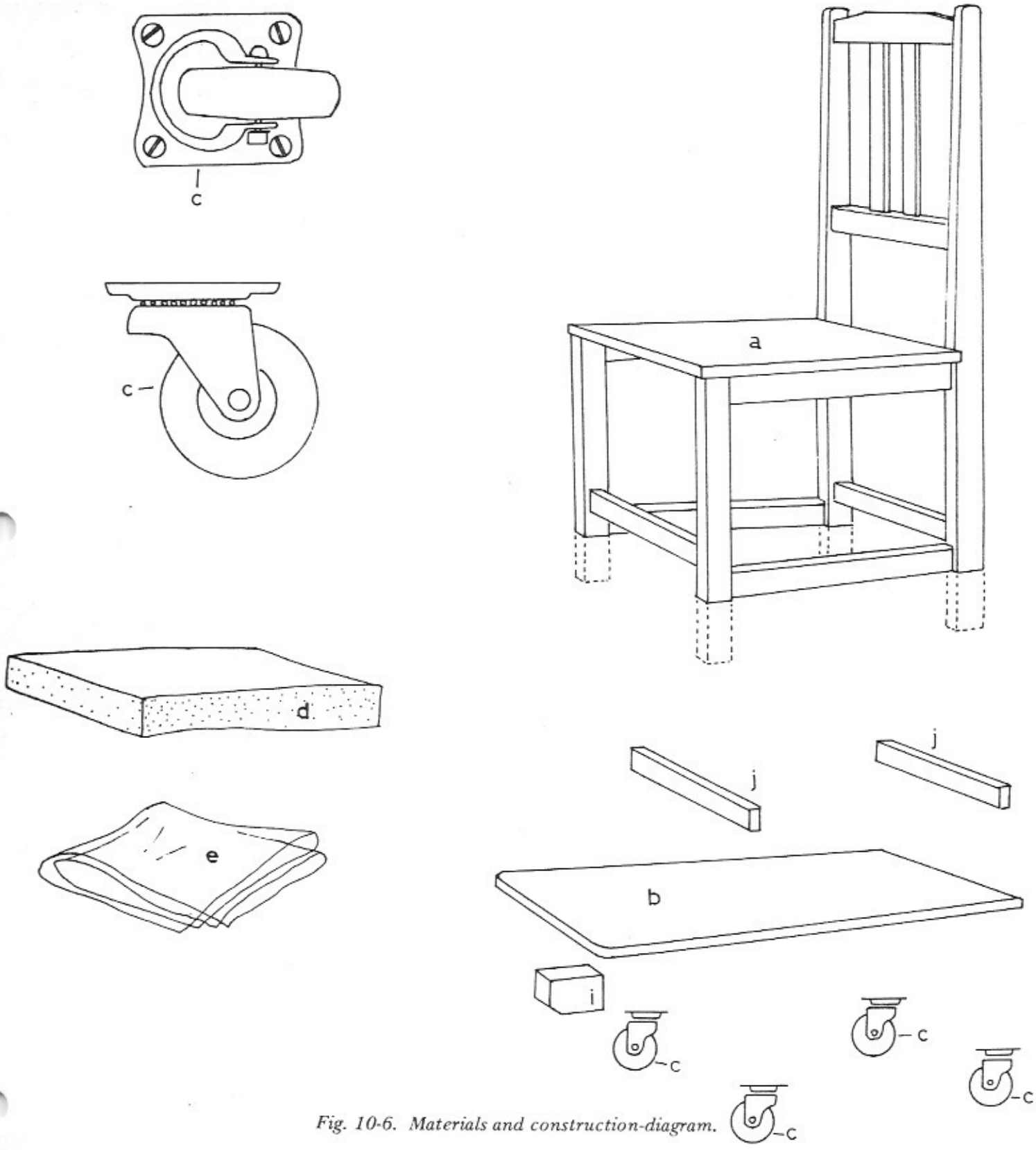


Fig. 10-6. Materials and construction-diagram.

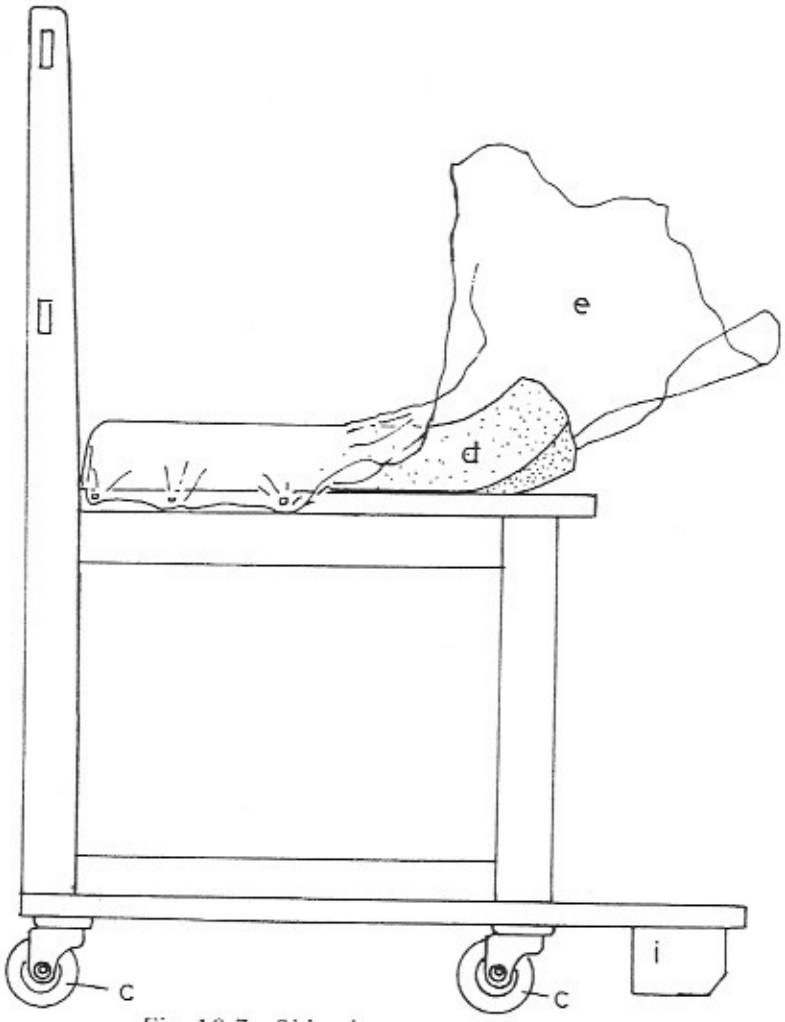


Fig. 10-7. Side view.

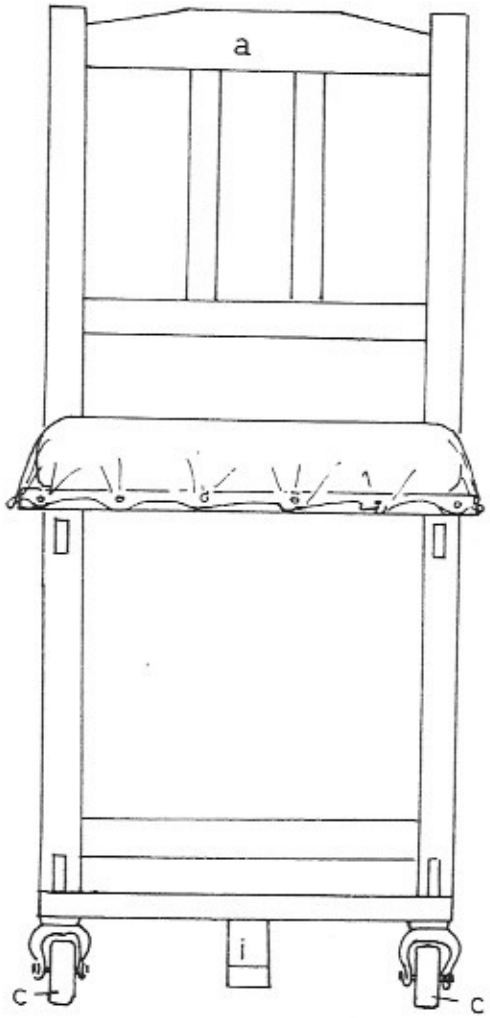


Fig. 10-8. Front view.

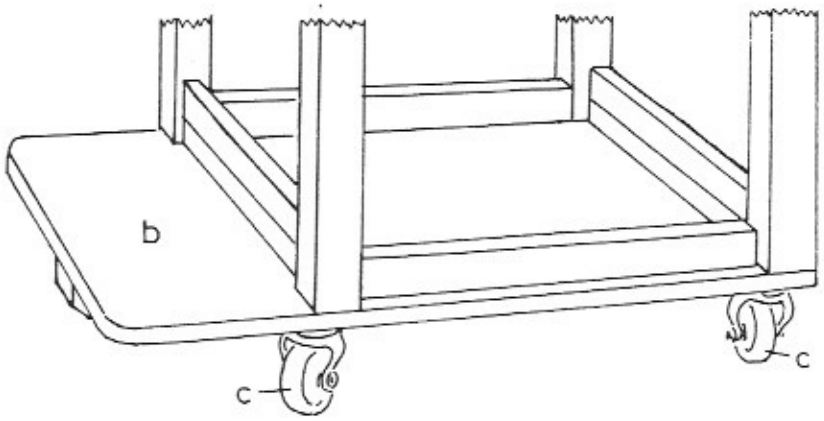


Fig. 10-9. Oblique side view of bottom of chair.

Variation: Chair with Removable Arms (Figs. 10-10 through 10-12)

Severely handicapped patients may need to have chairs equipped with removable arms. These arms also make it easier for one nurse to transport a crippled patient from bed to bathtub and other areas.

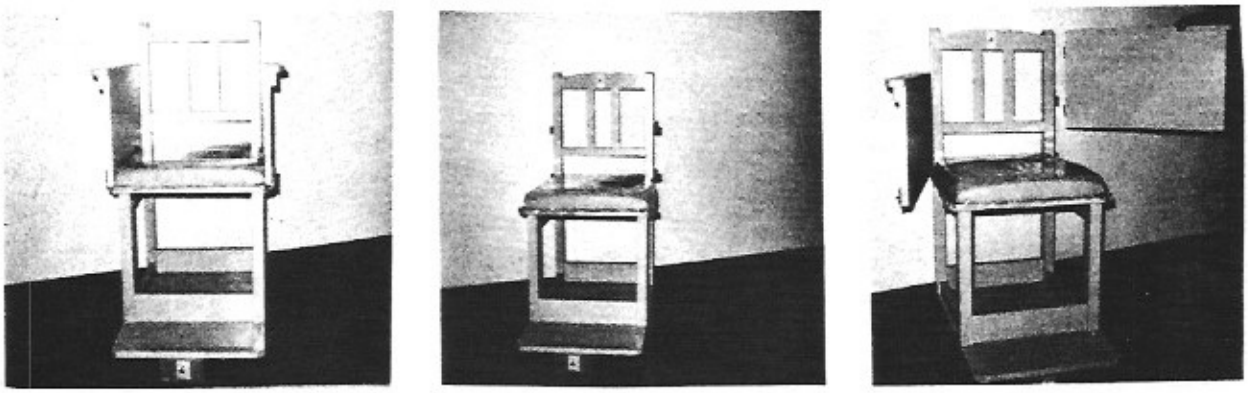


Fig. 10-10. Bathroom chair equipped with removable arms.

ADDITIONS TO MATERIALS GIVEN ON PAGE 81

LUMBER

5/8 in. (1.6 cm.) Plywood

Cutting Plan

2	18 1/2 in. (47 cm.) x 11 in. (28 cm.) for arms	f
2	19 in. (48.2 cm.) x 2 in. (5 cm.) for arm rests	g
2	18 1/2 in. (47 cm.) x 1 1/4 in. (3.2 cm.) for arm rest supports	h
2	hinges. Use as described on page 58.	

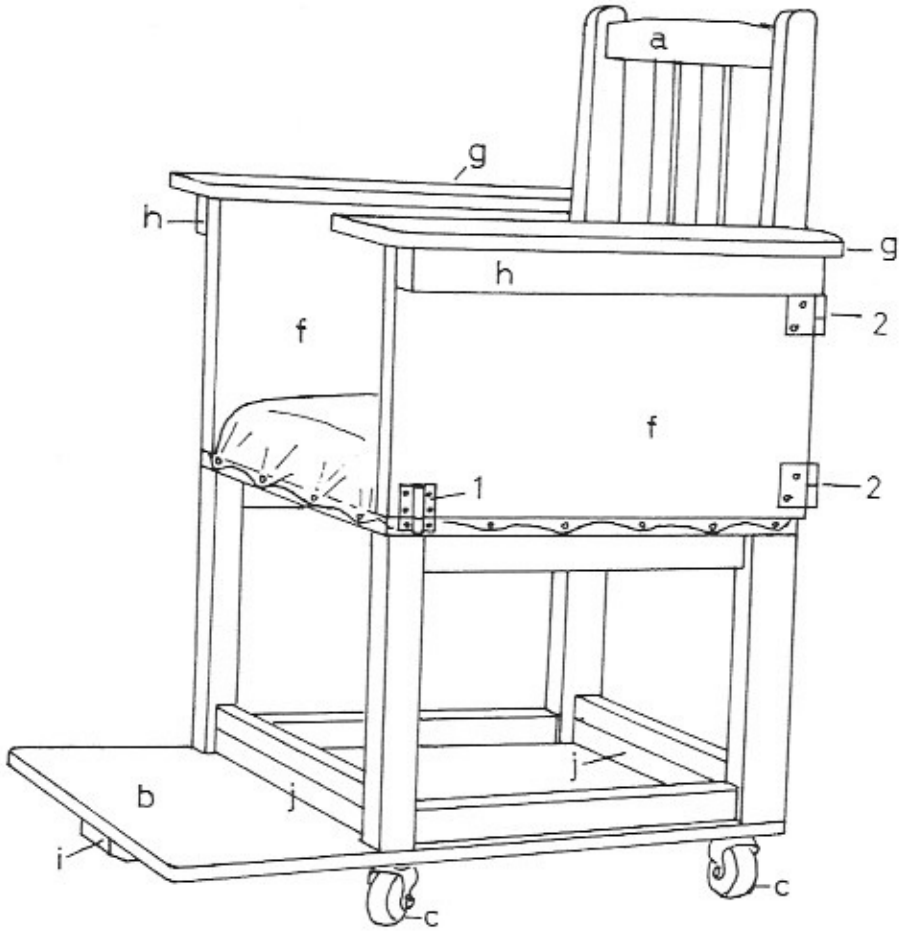


Fig. 10-11. Variation: Bathroom chair with removable arms.

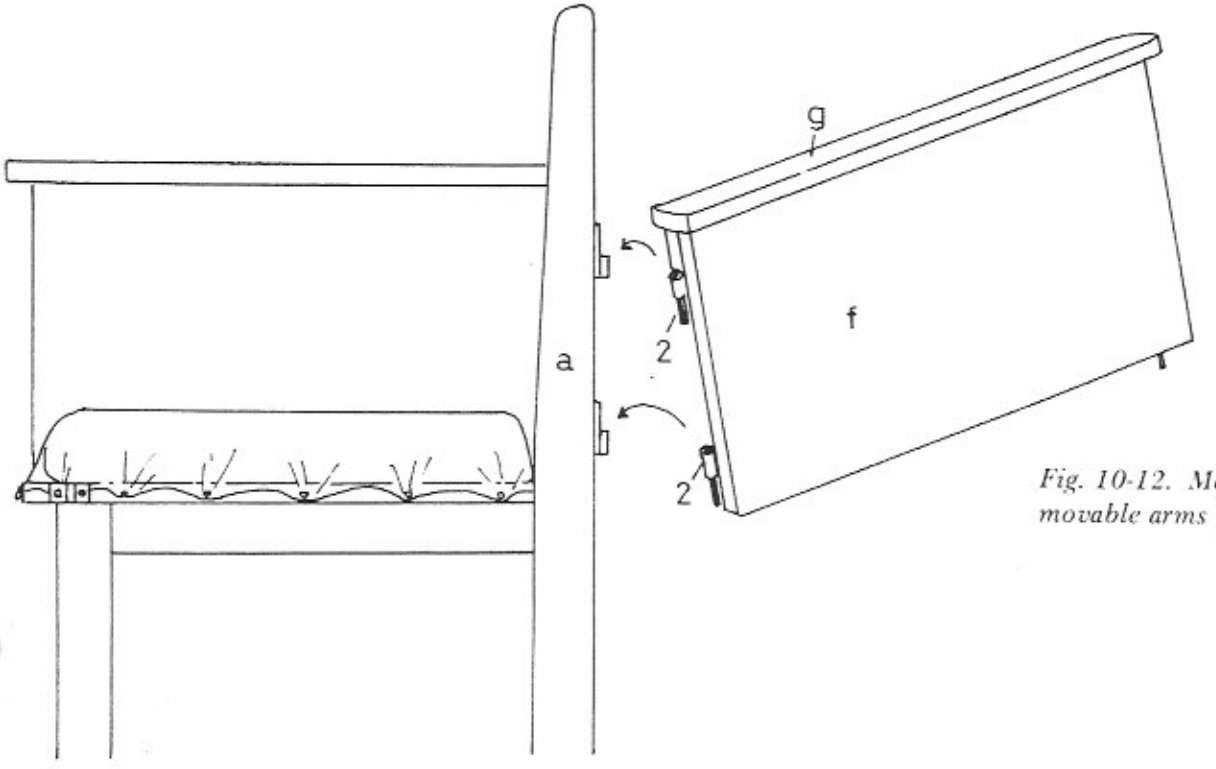


Fig. 10-12. Method of attaching removable arms (See page 58).